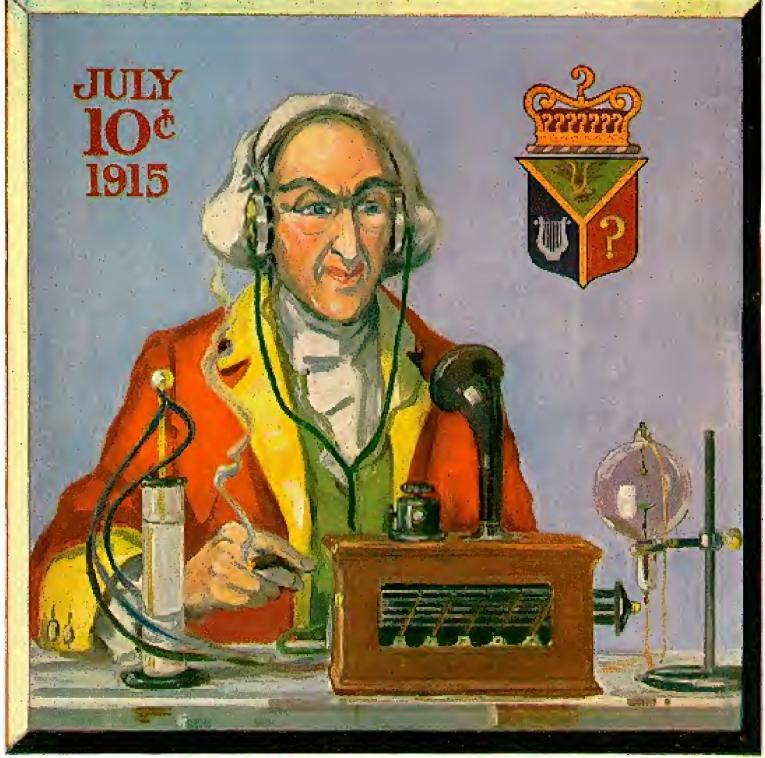
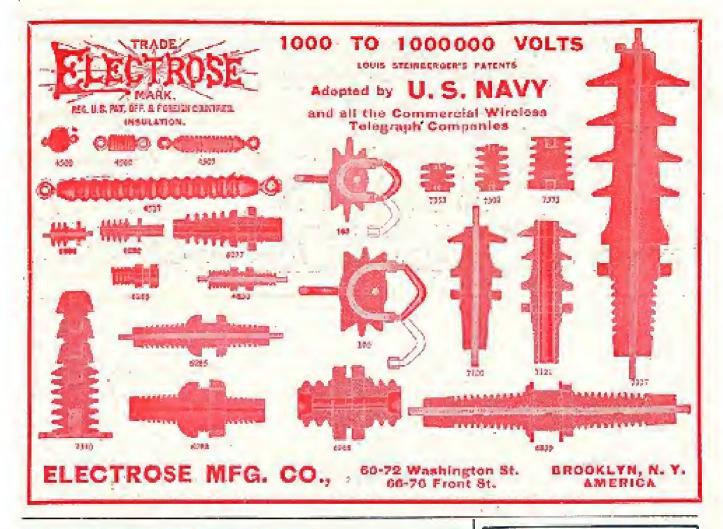
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Vol. III Whole No. 27

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"The Obsolete Submarine"

we invariably find that it is possible to combat weapon by weapon. Thus the early diff dweller could combat his club-winging adversary by means of a club; the one swinging the club most admitty wen. You can combat the lance with a lance; a sword with a sword; gun against gun; one cannon can fight another with a cannon; one battleship can attack and combat successfully another battleship. But—and here we have a singular exception, the paradex of the present war—you cannot fight one submarine with another submarine. Nay, you cannot properly combat—as that term is understood—the schematic with any present means. For we cannot fight what we cannot see; to-day, as in the past, the most dangerous enemy is the unseen one.

N amplyzing past and present means of warfare,

The modern submarine is dangerous only because of its invisibility. If we find a means to make it "visible" the submarine will become obsolute. When this moment arraives the battleship will come into its own again, as well it may.

The present submicrashle is made possible only due to the use of electricity; it could not exist without that agency. Our imagination need not be stretched unduly to presume that electricity will, in the not two distant future, be enployed to recolor the submatibe harmless. Indeed, scores of our greatest scientists all over the world are working along these lines, our own Freschness having already obtained certain results which stem exceedingly promising.

Speaking generally, a ship is safe in a harhor; it is emfangered only in the open sea. If the captain has accurate knowledge of the Wherenbouts of the submarine and if he sum away from it at full speed his ship, as a rule, cannot be overhanded by the relatively slow undersea.

craft. The obvious problem then is to locate the submarine when it is as yet from three to five miles distant. It is, of murse, necessary also to know in what direction the submarine is located, because it may make for the skip, running submersed, without showing its periscope.

How can we locate it then? The problem does not present unsurmountable difficulties. Several means may be used. We can imagine a very refined magnetic indicating detector mounted below water on each side of the ship. If this detector is sufficiently sensitive to large iron or steel masses (it could be shielded against its own ship) it would become a simple matter of locating the submarine or even a mine. For it must not be torgetten that a submarine of necessity sends out a considerable magnetic flux.

Another means to detect submarines lies in the use of some form of etheric waves. We can imagine an apparatus, say at the bow of the ship, sending out waves below the water while a smitable detector at the stern, also below water, is used to argister the "reho" and its intensity. The original waves striking the submarine will be reflected and bent book. The intensity of those reflected waves could be made to read off on a direct recording scale, giving the distance of the submarine in miles. Recent sevarables show the possibility of sending etheric waves below water, so we may be sure that the interesting problem of locating submarines will not remain unsolved for any great length of time.

The above presents such a right field of aggretunities for the investigator that it seems worth while to bend all our energies toward its successful solution. Humanity will breake easier which the now trenchenous submaring can be successfully combated.

H. GERNSBACK.

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Vol. III. Whole No. 27 JULY, 1915

Number 3

Perfects the "Telescribe" Edison

HOMAS A. EDISON, at sixty-right, announces the perfection of the tele-scribe, a combination of selephone and phonograph, by which the telephonic conversation of persons 3,000 miles apart

ation of invention and scientific development is centered in the new apparatus, which Mr. Edison says "the world will soon recognize as a great commercial as-It makes the telephone more useful,

sons are recorded on the wax record if important enough, it may be preserved, or it may be used 160 times if the intelligence on it is taken by a typist and the record "sleaved." What is known as a "telescript," a pasented form somewhat similar to a telegram and here shown, is signed and mailed to one of the parties that has talked, thould be desire an exact copy of the entire conversation. In case of a long distance telephone call, which involves considerable expense, in the absence of the person desired, one in the

office need only to press a button and the person at the other end may speak what he has to say into the phonograph to be listened to later by the person for whom it was intended.

More than a generation of invention and development is centered in the telescribe.

The two arts—telephonic and photo-

graphic—which it combines have been clustly associated in Edison's mind from the tarliest development. His experience wish diagraman action in the tarbon transmitter in 1876 led immediately to the in-

At Left: Mr. Edison Using His Newly Per-isoted "Telescribe."

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DER P. J. Land

200 4/3 -1211 US 19 HIH 04 антакіна 2° ык

MAIL OL room my Wetger millenge to my large & m. Gray Why &

Subjects Motor chart.

can be perfectly recorded on a way reducd Its completion gives Mr. Edison the credit for more than 1,500 inventions and more patents that ever have been issued to any other judividual.

With the telestribe, "canned twidence" of a linguist's own words in his own

voice may be heard by a jury.

The telescribe consists of a sensitive telephone for desk use with controlling battons to operate a recording machine nearby. It is so sensitive and so adjusted that the slightest vibration is recorded,

When he invented the carbon telephone transminer and the phonograph, thirty-eight years ago, Mr. Edison conceived the idea of the telescribe. More than a gener-

the phonograph more valuable and both more neces-

had there been a telescribe at either end of the transcontinental wife be-sween the White House and the Pon-ama-Pacific Exposition when President Wilson spöke the

wands that opened the fair, his sentences might have been recorded and perpetuated posterity.

After the words of the telephoning per-

Es. By Then I understined, Mr. Step, if we approve the named as Iron year did a laddy, we can expect delivation estiming the merger Mr. 61 that's more if I can get your order for at least flat themsel [6,000]. Mr. 87 The order for 1,000 year tonight with the approved samples, but live get to brow we will get the first remes by spin 1000, delivated 500 a week effort lat. Er. 8: You get no the employed samples with the suder, and till 40 my part. Br. 8: Say, Grey, I want you to note the shape we seek in the top large----wither made them a little heater. Don't forget to there your diselector pay commerce the ran. Mr. 0: That will be all right,

no Protesting

Above: A Specimen "Telescript" or Record Made on the Edison Tele-phone Massage Recorded. It Works Automatically and Saves is Lot of Time in Handling Everyday Business.

vention of the phonograph in 1877, and we find his early prophecy of the telestrike in these words:

(Continued no page 84.)

THE PLEGIRICAL EXPERIMENTER is published on the 15th. of each month at 200 Pulton Street, New York. There are 12 minsbers per year. The subscription pelos is 66 cents a year in U. S. and possessions. Canada and foreign countries, 75 cents a year.
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THE ELECTRICAL ENPERIMENTER. Meachly, Entered As second-class matter at the New York Pees Office, March 1, 1216, under Act of Congress of March 2, 1275, Title published 1, Patent Office. Congress of March 2, 1275, Title published Constitution of this meaning are conjugated and must not be repreduced without giving full credit to the publication.

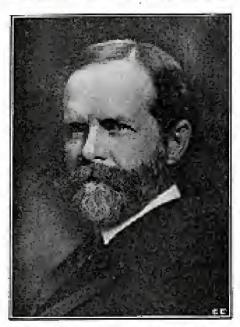
A Day With William J. Hammer

By Samuel Cohen.

T was a mid-week day, not long ago, when I took advantage of the invitation extended by William J. Hammer to visit him in his laboratory in New York

City.

First and Johnnoss, Mr. Hammer is a consulting electrical engineer, and was one of Edison's equices assistants at his Manlo



Mr. William J. Hazemer the Well-Kinnen Consulting Engineer of New York City.

Fark laboratory during the development of the incandescent lamp, telephone, phonograph, electric sailway, etc. This gentleman was one of the real pioneers of the incandescent electric lamp and in the development of the transmission of electrical power, both here and abroad, having been chief engineer of the English Edison Co. in 1881-9, also chief engineer of the German Edison Co., known as the Allegemeine Elektricitaets Gezellschaft, in 1883-4.

In 1888 Mr. Hammer invented and constructed the first motor-driver electric "flasher" sign, now universally employed. This sign, which flashed the name "Edison," letter by letter and as a whole, by means of a commutator or "flasher" driven by an electric motor, was placed on top of the Edison Pavilien at the International Health Exposition in Berlin, Germany; also a simpler form was constructed to be operated by hand as early as 1881, and it was used for a year at the Crystal Palace Exposition in London.

After we had had an interesting chat this great man conducted me to his marvelous laboratory, which is seen in Fig. 1. It is in this laboratory where the most wonderful experiments and discoveries imaginable in phosphorescent substances, X-rays, ultra-violet cays, radium phenomena, selection, etc., have been conducted.

This savant is one of the leading authorities on scientism in this country and has compiled a remarkable hibliography upon the subject. Many different types of selentism cells have been devised for various purposes. Some of these he has invented and parented, and has also perfected automatic devices for starting motors, controlling gos and electric street lights, for opening iron window shutters in the morning and closing them in the evening, automatically firing cannot, the

prevention of boiler explosions, properling rates, etc. This untiring worker has also developed to some extent, a system of "seeing over a wire" and has patented a selentium photometer. All these devices are operated with selections cells. Various experiments have been carried on in radiotelephony by the use of selentium cells, and wireless has been employed for domestic purposes in his house, for calling servants, ringing bells, etc. He was for a sime associated with the late Prof. linest Ruhmen, of Berlin, Germany, who is well known for his experiments in radio-telephony and selentum-cell work, as well as for numerous technical publications.

To resume: In a few minutes the laboratory became dark and site wizard performent for me several extremely interesting experiments. For instance, I was told to watch a large bouquet of artificial flowers, which appeared in their natural color. A Weintraub-Steinmets mescury are lamp

To resume: In a few minutes the laboratory became dark and she wizard performed for me several extremely interesting experiments. For instance, I was told to watch a large bounget of artificial flowers, which appeared in their natural color. A Weintzaub-Steinmets mercury are lamp was now lighted and kept in operation for a few moments. The lamp was then extinguished by opening a switch. The room was dark as pitch, but the flowers, roses, tulips and lifles, which could not be seen at all a minute before, now gletterd brantifiely with many different colors. Further demonstrations included numerous bottles containing chemical and mineral substances, which by exposure to the mercury lamp also radiated glowing rays, and cath bestle had a different color. Figures, letters, statucities, even model actroplanes and balloons, etc., around the room, all became brilliant. It was explained that all these objects were coated with some special phosphorescent substances and, when stimulated by the mercury lamp rays, they will give off considerable light for a long time. The phosphorescent mixtures used on watch

brilliant color in the dark when the submannes are stimulated by the mercusy are lamp or ultra-violet light, stellight, etc. A basic patent upon this discovery has been allowed.

Mr. Hammer has spent an unbelievable amount of study on the phenomena which occur inside and outside of different types of vacuum tubes. Note the many shapes and clocks of tubes seen on the shelves of his laboratory. Another ingenious device I gaw was a machine driven by electric molors, by means of which can be illustrated, mechanically, upward of 100 different forms of physical phenomena.

No less than 34 long years were expended in systematically collecting various kinds of electric lamps in this country and in Europe. This was done for the purpose of showing the complete steps in the development of the incandescent electric lamp, from the gorliest work of Edison, Swan and others to the latest missagentungsten lamp. Five large glass cases, four of them 10 feet long, contain the collection, which is exhibited in the rooms of the American Institute of Electrical Engineers, 35 West Thirty-ninth street, New York City. One of these cases is shown in the photograph Fig. 2. The collection comains more than 1,000 different lamps, and this collection which Mr. Hammer has termed the Tistory of an art," represents the only art in the world of which such a record has been unite. It is thoroughly complete and without a single important missing link.

The radiant efficiency of the original carbon-filament incandescent lamp was about 43 of 1 per cent; that of the tungstea lamp about 5 per cent, and that of the new nitrogen-tungsten lamp is about 10 per cent. On the other hand, the light of the



Fig. 1. The Marvelous "financer" Electrical Laboratory, Where Every Conceivable Interesting Scientific Instrument is to be Found.

and clock dials and containing radium (416) were originated in this laboratory. After years of study it was discovered how to combine phosphorescent and fluorescent substances so as to produce practically any

fire fly and the "pyrophorus noctilerus" or, as commonly called, the Brezillus heele, have no chairney of 96.5 per cent. 25 shown by measurement, made by Protestors Langley and Very with the bolometer,

and also by Coblentz with the thermopile. This investigator believes that "cold light" is the seal light of the future. Already photographs have been taken by the light of fre-flets and other forms of "cold light" is 32 determined. in his laboratory.

Photograph 3 shows a case of historic wires which have been collected, now all joined in one continuous circuit and containing sections of wires and callies which at various times formed parts of the most important electrical circuits in the history of electricity. At the top of the case is a piece of wire over which Prof. Second F. B. Morse sent the immortal first message by telegraph. "What hath Ged reranght?" Immediately below this specimen there is a length of a lew inches of wire through which Prof. Absorbed Cashan 241 and which Prof. Alexander Graham Bell and Thomas A. Watson, his assistant, made all their early experiments on the telephone from 1875 to 1877, and through this wire passed the first electrical transmission of audible speech in the world in the year

The third of these historical wire mementos is a section of the Atlantic cable over which the first successful message was sent between the old and new worlds by Cyrus W. Field.

In the center of the photograph will be seen a safety fuse or ping used in London, England, on Jan. 12, 1882, to close the circuit of the first incombescent famps ever lighted from an electric lighting central station in the history of electricity. This interesting event took place at the Holborn Violent Central Station, and it was Mr. Hammer himself who made the initial conmeetion. Beneath the fuse is a paction of the first "Sprague" trolley circuit used at the historic plant at Richmord, Va., in 1889.

The sixth is perhaps the most interesting of all the relies, being a section of the deep-sea portion of the new American-Pacific cable, through which the initial "assend the world" message was sent July 4, 1903, by ex-President Rossevelt. It is interesting to note that the Postal Telegraph



Gig. p. Core of Historic Wires and Cables in the Wenderdul W. J. Hammer Collection.

Co. borrowel this exhibit case of historical wires and connected it in the circuit. The message thus passed through all the old wire specimens. The seventh is a section of the wire through which the electricity was sent to illuminate the headquasters of the A. L. E. E. by Moore's system of vacuum tube lighting, this being the first

room in the world so lighted. The eighth and last is a section of the cable through which the first electric current was transmitted from the Niagara Falls electric power plant, April 16, 1825.

Mr. Hammer is a fellow and life member

some of the trials of the experimental

period.
"The telephone has developed so much in recent years," Dr. Bell said in accepting the medal, "that I have almost forgotten my part in it. When I think of the present

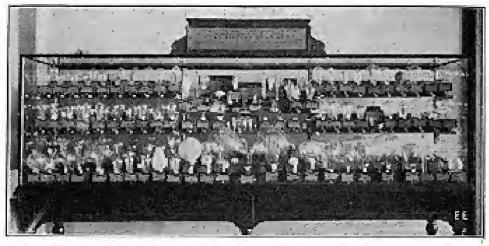


Fig. 2. Publish of Incondescent Lamps Prepared and Collected by Mr. Hummer. No Important Link in the Development of the Incondescent Lamp is musing.

of the American Institute of Electrical Engineers, fellow of the American Association for the Advancement of Science and has been vice-president of the American Institute of Electrical Engineers, the New York Electrical Society and the Acro-nautical Society of America and is a mem-ber of many other bodies. Also the Elliott Cresson and the John Scott medals of the Franklin Institute, the "Ceand Prize" of the St. Louis Exposition of 1994, and sereral other medals here and abroad have been awarded this profound thinker and scholar.

Some of his runnerous press contribu-tions include a book on "Kadium and Other Radio-Active Substances;" also spe-Contraction articles for the Encyclopedia Americanas editorial collaboration on the Aero Club's book, "Navigating the Air," and in conjunction with Hodson Maxim, the "Chronology of Aviation for the World Almanus of 1911 was compiled. This has since been reprinted and is the accounted and property of the history of the accepted authority upon the history of the act of flying. His multifactous duties have included that of servetary and expert of the Aeronautics Committee of the Hudson-Fulton Celebration of 1969, besides appearing for the famous Wright brothers in all their acroplane patent shits,

Few men, perhaps, in their allotted cycle of life have been interested or identified with a greater number of engineering projects than this pleasant-taged man who counts among his innumerable personal friends the leading scientists and engineers of every country under the sun.

EDISON MEDAL GIVEN TO DR. ALEXANDER BELL.

Dr. Alexander Graham Bell, inventor of the telephone, was cheered long and heartily by a company that filled the auditorium of the Engineering Societies' Building. New York City, on May 18, where he had been summoned to the annual meeting of the American Institute of Electrical Engineering Designation of the American Institute of Electrical Engineering Designation of the American Institute of Electrical Engineering meers, to appeire the Edison modal for meritorious achievement in electrical

John J. Casty, chief engineer of the American Telephone and Telegraph Com-pany, made the presentation, after Prof. Thomas A. Watson, of Besson, mechanical expert for Hell at the time of the tele-phone invention in 1876, had spoken of

system I realise what other men have done, and how much we owe to them. To me Prof. Watson represents the past of the telephone, Mr. Carty represents the present and the American Institute of Electrical lingineers represents the future.

The question with me is: Are you not some day going to see by telephone? The end has not come. I am struck by the fact that nearly all secont developments has had to do with vibration. I wonder what it may not lead to, when our engineers turn their genius to some of the many other fields of the work."

EDISON PERFECTS THE TELE-SCRIBE,

(Continued from page 83.)

"Among the many uses to which the shorograph will be applied are the following: Letter writing, and all kinds of diefation without a stenographer; consection with the telephone, so as to make that invention an auxiliary in the transmission of permanent and valuable records, instead of being the recipient of montentary and fleeting communication."

Ground wires for metal mouldings must be of copper at least No. 10 B. & S. gauge.

SOME ELECTRIC LIGHTING RULES.

The following simple rules should be observed in considering lighting installationsc

Don't work in a flickening light

Don't expose the eyes to unshaded lights. in the direct range of vision.

Don't judge illumination by the bright-ness of the lamps,

Avoid extensive contrasts.

Use the right type of globe, shade or deflector.

Make sure that the illumination is sufbelent.

Keep lamps, globes and reflectors clean. Make sure that tamps are in the right

The Panama Canal was begun nine years ago and haz cost \$320,000,000; within the same space of time the Bell Telephone Company has spent swice that amount in its engineering construction work on the transconfinental telephone line alone.

New Inventions in Photoplays

O-the photograph we see below is not that of a bond of Chicese consuirntors catching secret wireless messages! It depicts an interesting mo-ment in the Pathe moving picture produchals in the past few years is that known as the Sphymograph, or the instrument which can record the state of human emotion. This apparatus is seen in the picture accords presented, which is taken from



The Mayle Villain, "Wu Pang," and His Mon Listen to "Craiz Kennedy's" Convergation by Mouns of the Listening Car, or, As We Know It, "The Detectophene."

tion, "The Exploits of Elaine," being from episode. No. 21, enti-led "The Lastening Exp."

The story, of course, revolves about the leading characters of "We Fang" and "Craig Kennedy!" the scientific detective. The Unisaman, "We Fang," pits his eleverness and scientific abilities against those of the well-known detective character in the story of the photo-play.

The vital moment here shown is that when "We Bang" manages to have his assistants install a "Detecta-phone," or as it is termed in the picture more mysteriously, "The Listening Ear," so that he and his assistants, who are located in the same building as "Craig Kemerdy's" office, can overhear what he has to say to his assistant. annieitent.

This picture is one of the most inceresting, in several ways, of those so far shown in the famous Pathé film feature, and it is very exciting to see "Craig Kennedy" lo-Very extaining to see "Craig Neanedy locate the hidden Detecta-phone wires in his office by means of the "Kennedy Galvanostope." This galvanoscope is one of the largest ever seen in captivity, to put it mildly; but of course it is necessary to use large instruments which will show up in the proper way on film pictures, etc. To returne: When the instrument is brought that the hidden using by "Crair Naturals." near the hidden wires by "Craig Kennedy" the leaves of the galvanoscope, which measure about 4 inches in length, are seen to flap back and forth in a very conderful manner. However, the general features of the instrument shown are undoubted to the instrument shown are undoubtedly brought out in a very strong manner, so that the uninitiated in the audience will be sure to gain the general underlying prin-ciple involved in the apparatus used. An electrical device which has been men-tioned a number of times in scientific inser-

the Pathé film emitted "The Exploits of Elaine and depicts the famous characters In the picture here presented "Coalg Kennelly" is capitaining and demonstrating the Sphyringgraph to "Elaine Dodge." Later this remarkable instrument is excessfully conderned to employed to secure the correct address of the Chicaman, "We Fang," who is always retentifically scheming against the science And art of "Craig Kennedy,"

The principle of this instrument is based on the last that if a cosperted person, such as a criminal, is successively plied with statements along the line of information desired, that when the correct indication is spoker, that the heart and therefore the price will invariably and faithfully monutarily increase in activity. The per-son's face may not show this (as is well known, of course, in the case of expert criminals), but thanks to the Sphymo-arch, which experies of a continuous graph, which consists of a sensitive microphonic contact arrangement strapped to the wrast of the person suspected, it is made wrist of the person suspected, it is made possible for a sensitive galvanometer, seek in the picture, to throw its moving beam of light across the scale, which we also see in the Elustration. For instance, in this "crowle" story the young lady accomplise of "Win Fang" is taken to "Craig Kennedy's" laboratory and when he has her placed in the chair the special wrist, land is attached and the action taking place is as follows:

The detective resears numbers on Pelli

The detective repeats numbers on Pell street, where "Wu Fanz's" headquarters are supposed to be located, and the secies of numbers repeated begin with "t." When he has reached "No. 14" the Softrangraph faithfully records an internal change in the emotion of the young lady by swinging its beam of light from the galvanameter class across the senter. clear across the scale,

Thus it is seen that while the instrument does not read the human mind in the ordinary sense of the word, it truly fore read it nevertheless, even though an an indirect yet positive manner.



The "Sphymegraph" is Demonstrated to "Blates Dodge" (Miss Pearl White) by "Craig Kennedy" (Me. Arnold Daily). Scene in the "Explosis of Claime," Pathy Film.

of "Craig Kennedy," the scientific detec-tive, partrayed by Arnold Daly, and "Elaine Dadige," in the person of Miss Pearl White,

This may be likewed in a general way to the method used in the courts of India. (Continued on Lage 102)

PASSAIC HAS A WIRELESS CLUB. At the first meeting of the winter scason, the Wegotta Radio Club, of Passaic, N. J., reorganized with three new members. The club started with five members two years ago for the purpose of advancing the knowledge of wireless telegraphy among its members and to bring together the operators of amateur wireless stations in Passate and visinity is order to discuss topics pertaining to radio communication and take part in lectures which are given from time to time at the club room.

All the members are licensed by the government to operate stations, and four have been appointed relay stations of the American Radio Relay League, which is an association of amateur operators whose stations make up a chain screeching the entire length of the Atlantic Coast and connect the Atlantic with the Pacific across the northern part of the country. Any of the operators of appointed relay stations may originate measages and thru this series of relay stations may be considered to the stations of the stati tions, send messages to almost any part

of the country, The Wegotta Radio Club of Passair the wegotta Reside Cano of Passant neets on the second and fourth Thursday of each month at No. 35 Pennington avenue. The secretary will be glad to bear from any one who is operating a wireless station and wishes to join the club. There are no does or initiation fees.

The members are: T. E. Ackerman, H. V. Berger, J. L. David, R. Hucedin, C. N. Humprey, E. S. Fearl, W. F. Tense, J. M. Thomson, G. S. Yerbury.

HUGE TELEPHONE AT EX-POSITION.

The accompanying photograph shows a desk telephone set which measures 19 feet high. This gigantic telephone was placed in the rooms of the Western Electric ex-hibit at the San Francisco Expesition. This telephone in appearance is a replical of the ordinary telephone used every day. Compare it in size with the common desk



Materiath Telephone Model Habibiled by the Western Elec-tric Co., of the "Prisco Expedition.

set shown in the picture. This exhibit is one of the most interesting at the exposition. All kinds and styles of telephone apparatus are shown and demonstrated.

Uncle Sam's Battleships at Night

Many wenderful electrical sights were produced during the recent review of Untile Sam's lattleships on the North Siver, New York City. The plustograph herewith light into the night. Some of these search-light beams were seen many miles distant, Note the illuminated star between the masts on the Bauleship "Texas" at the



Photo (C) by International News Service. Beautilai Effect at Night on Hadson River. New York, When Uncle Sam's Mighty Dresdaoughta. Threw Skywaed Their Powestal Sesseblight Repres.

shows two of the battleships illuminated with electric lights and the gigantic searchlights ilushing their powerful beams of

ELECTROPLATING WITH COBALT.

Probably no other paper presented at the spring meeting of the American Electro-

chemical Society is of such general interest as the one by Mesors. Kalmus, Harper and Savell, dealing with the elec-trodeposition of consist. This is on account of the facts brought out indicating that cobak may well replace nickel in a great many applications. where nickel plating is now used. For the past 20 years nickel plating has been widely critized to protect other metals, such as from from oxidation, and to give a finished surface which would take a polish, have an attractive appearance, and not easily cor-roded. The performance of nickel has not, however, been ideal. Peeling of the cickel has not been uncommon, and oxidation is not unknown.

Cobalt is in appearance somewhat similar to nickel, but it has a bluish cast. Its specific gravity is about 8.8, or nearly the same as nickel, but its hardness is greater than that of either nickel or iron. This restore the strong control of the strong con

be entistactory as a substitute for nickel. and would have some advantages over the latter. Its wide commercial use will

Hundreds of horse-power of electrital energy were used in the lighting of the battleships, each one supplying its own, power of course,

During their stay for the review a boat more truck plane at night, the river being well lighted by the searchtights of the fighting-ships. Persident Wilson was an interested spectator at the race, which was won by the basky crew of the mighty "Wyoning." A single searchlight beam marked the finish line for the boats; rather a novel race marker indeed.

The whole sky was alive with inter-crossing beams of light during the evenings and a most beautiful effect, impossible to describe, was produced when for instance, half a dozen searchlight beams were, played in one direction over the sky, while a similar battery of light beams was played past them in the apposite direction. Some of the war vessels evidenced the exercise of great ingenuity in arranging spectacular illumination effects, which were highly enjoyed by the large crowds parading River. side Drive nightly.

depend upon the cost of the metal and of the plasting operation, the rapidity with which the work can be done, and the adherence of the deposit. The authors of the paper provide some interesting information on these points.

Where suitable plating solutions are used the deposits (on a variety of metals) are found to be firm, adherent, hard and uniform, and can be deposited at a much more rapid rate than is feasible with nickel.

Although wireless apparatus was not fully developed until 1990, it is estimated that over 6,000 lives have been saved by 145 Mac.

Baron Münchhausen's New Scientific Adventures

Bang! Bang! Bang!!!

Boar terrible shots rang out

A heart-rending moan—a piereing cry. Then a long, ominous silence.

BANG ! BANG !!!

Two more shots more terrible than the first ches.

"Dick!! Dick!!!" No answer "Oh, Dick!!!"

Less abswer.

The pice trees mounce plaintively in the otherwise oppressive silence. Suddenly a fone awl hoo-bood sharply and simultaneously a flash of lightning illuminated a scene of overpowering dread. I looked on aghas:-my bair stood on cud. I trembled violently, for what I had seen there was so terrible, so dreadful, so awful that it is impossible for a human being to describe it. For that reason I must refrain.

New, honest, agmit it. Was that part a good begin-ping? You can't deny that it grioned you. The trouble these days ig that it is rather hard work to make people read stories. Most stories are nut worth reading to begin with. You begin with. look as the heading and feel lukewarm. Then you read the first sentence and chances are you immedi-ately form the opinion that the author is no insufforable bone head. At that, you may do him an injustice. He probably is only a second rate idiot. No

matter, you won't read his stuff. That's where advertising pays. Put something real exciting at the beganning, even if it has no beering at all on the rest of the story. Most anything goes, the more mysterious the better. Also—advice to authors whose rent nones due too frequently—the longer you draw it out the better. For the editor—unless he is an old crust and blue pencils most of it will pay you real money for that dope unless, of operse, his sense of humor has gone to speech activities. Most oditors has

you real money for that dope unless, of course, his sense of humor has gone to soush entirely. Most editors has.

(Editorial Note,—We found it necessary to suppress 29 pages of Mr. Allier's manuscript here, as his remarks become entirely too personal and too constit.—Editor.)

By Hugo Gernsback

Münchhausen On The Moon

Now it is a proven fact, supported by much evidence, that people in these days are fond of terminating things once started. Just so with a story. You beginerading a tale, no matter how pointful, and once you have spent three minutes in it injury-nine charters out of one hundred you will see it through to the read. It's like a good "ad." If once you are made to read

thinks he is going to spring a big surprise on them at the very end has another guess coming!!

So the smart author doubletrosses you and puts the coal and somewhere in the middle of

the book. Then on the last page he orranges for a tearful parling of the kero and the heroine, intimating strongly that the two will never, never be manifed. That leaves you guessing. For if you haven't read the entire story how were you to know that they seally got married in the end (in the middle of the bask)? But the smart author simply tacked on a few chap-

ters—after the end—showing that the heroine eide's like the hero's liver and that likewise the hero objected to the heroine's guil and to the scent of her face powder. So after things became unbearable they got a divorce—at the end of the book. That's what I call good construction of a story. But to get down to business.

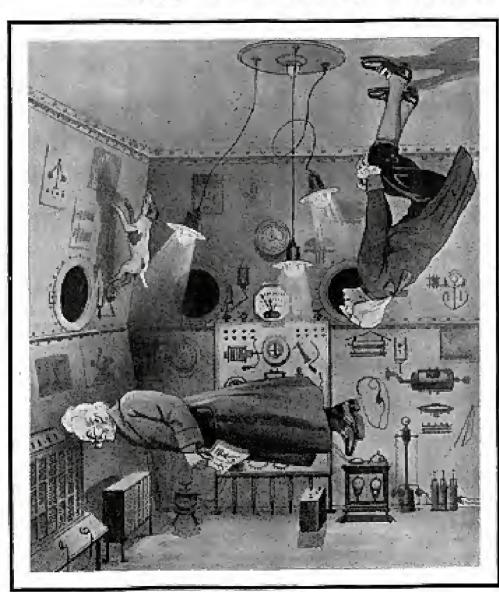
After I knd dested myself off and had made certain that the varicers assembers of may amatumny were still on intimate terms with one an-other I limped off in the direction of my home. As I was not in a butry i took my time about it. I cheekfed inwardly for the good reason that on account of my varie ous bruises I dared not chuckle ontwardly; as with General Jose in Francetime worked for

But I get ahead of myself again and being ton insolent to rewrite this paragraph and pulling it ahead of the one above you will have to read it as I wrote it. If you don't approve it fast I suggest that I suggest that I meread of

reading the first paragraph first, to read it after the ones that follow this. That will

simplify matters considerably.

The facts are briefly these: At the very beginning of this story I have told you how I had been of immeasurable benefit to the human race. I told you how as president of the "American Wireless Mouse-Trap Co." I had rid the country of mice and rats. I had told you how far-fained I was for being the first man to talk all around the globe with my historic wireless telephone. The name of I. M. After is linked with the greatest scientists of the world. For that reason I did not think myself immedest when I went to see Mayor Evrah



... he remained suspended in midale without anything supporting him

the hear line you probably will read the text of it. It is the same with a story. Hence I larg your pardon for having taken an unstair advantage of you; in these times of fierce competitions "us posts authors" must report to unusual means, even if it is against all international laws. Just like the German submarine wantere.

Of course, I must admit that the plant has its defects. For with fermile women it den't work. You see they are forcy. You can't fool them that easy. For they have a cantankerous habit of reading the end of a story first! They laugh up their eleeves—it sleeves are in eight that season—and the poor simp of an author who Cappright, 1916, by H. Grantseck. All rights reserved.

Coddismaker, of Yankton, the town of my birth, with a simple suggestion.

There is a small triangular plot at the intersection of Main and High streets. It had come to my cars that a symplecte had been formed to purchase this plot from the city with the object of opening a combination hot franklurter, flower and barber shop there. As the city would have to erect a monument to my honor sooner or later, and as the site was ideal for this purpose, I went so the City Hall and sold the Mayor to. I thought I might as well arrange for the monument during my ilfe-Remirc.

Mayor Coddlemaker, who had always been a stauged friend of mine, received me warmly. While I explained my relation to him, the color of his usual pink face

changed to that of a tresh boiled lobster. Then it went over to a delicate shade of purple. I know now that his inner temperature must have risen from 100° in risen from 100° in the shade to 150° in less than two minutes. I began to feel sorry for him that he had neglected to attach a safety valve to himself; it would have been decidedly useful just then. Fearing that His Honor was about to blow up the City Hall with his own person, I tendered him a glass of water. This, however, did not have

the desired effect on him, but instead he took on four shades deeper of a beautiful purple and emptied the contents of the glass in my face. Most of it went down the neck of Coollemaker's secretary, who was working with his back turned toward mine. While I wheeled around to applogize so the secretary, Mayor Coddlemaker, who is an ex-princhighter, took me by the napof my neck and spun me around like a top. This seemed to limber him up somewhat, and he became so delighted that he tried me out as a carpetsweeper, my face forming the business end of the sweeper. His Honor then amused himself for some minutes in playing ball with me. I obliged him by taking the part of the ball. My sense of homor being sadly delicient, I failed to see the joke after awhile. I told His Humor so between my rapid trips up to the ceiling and down into the Mayor's fists.

He bellowed something about him and the town of Yankton being made the cen-ter of derision with that fool "Münchhausen" story of mine. He playfully added that the papers poked for at him day and night for letting me stay out of the lutation asylum. He also mentioned that Yankton had become a permonent feature in all the comic supplements of the country, that on account of my hair-brained story I had definitely rejaced not only his career, but the future of the town as well. He gleefully remarked that he had been itching to lay bands on me for a whole month and he thanked me profusely for having ratio-fied his itah! Wherespoon he dumped me in his waste basket and while his secretary held the door open His Henor emplied the wante basket with a flourish. Without woiting to applied I look a basty departure.

Now comes the paragraph where I had dusted myself, etc., etc. See allowe.

On my way home I sympathized deeply with Mr. Galilei Galileo, of Piea, Italy. He once took a fool notion in his head and told the world that the earth was not standing still, as popularly thought, but that it spun around like a top! Whereupon the world poked from at him and his follow citizens playfully intended to burn him at the stake. But Gulileo was a good talleer and an elegant advertiser. He kept tell-ing them E four at massive, also what an advantage it would be to have the earth spin around, because everybody would get a ride for nothing, and on the trip acound people would see lots of new scenery in the universe. He also was eareful to tell them that if the easth was to stand still, there would be no seasons any longer and, furthermore, one side of the globe would have a perpetual day and the other side a per-petual night. If by change Italy should come on the dark side well, good night!!

■S the moon really a dead and barren world as our scientists contend? The most powerful telescopes can only scan the moon's surface, but we know nothing of the interior.

The versatile Münchhausen has been doing some exploring and he tells us a few things, which somehow, sound plausible. Incidentally, do you know that you can jump thirty feet high without much effort on the moon? If you don't, this story will tell you all about it,—and a good deal more.

> So they thought it best to let Galileo have his way and passed a resolution to let the

> earsh spin around indefinitely.
>
> Not that I want to compare myself with Galileo. Far be it from me. I only meation it to show how misguided the world is at times. It was so in Galileo's times and is so now. In years to come my story about Münchhausen will be believed, just as Galileo's preposterous idea that the cartin moves is universally accepted to-day.

Just now I am a martyr to a just cause. In due time Yankton will erect that monument for me, or my name is not I, M. Alier.

Whatever Münchhausen's shortcomings might be, be certainly is prompt. If I were his wife I probably would adopt him, for he is always on time to the second. If there were a Mrs. Münchhausen I am sure she never would have to wait with the supper for him. He would be there on the des, or he would have a mighty good excuse, and by it said here. Münchhausen does not make exenses as a rule.

My clock had just began striking the eleventh hour that evening when, true to his word, Münchhausen "called." There was the familiar, pleasing screech in my phones, growing loader and loader, and in another seepad communication between Münchhausen's station on the moon and my own station in the sleepy old town of

Yankten, Mass., was once more established, "Good evening, my dear Aller," it came in clear, deep tones, in that sepulchral voice I had come to cherish, "are you ready for our nightly chat?"

"Indeed I am, Your Excellency," I made haste to reply, "how is your health this

evening?"
"Perfect, perfect, my boy. Never felt better in my life. The air up here is so invigorating that I actually grow younger

"But I thought there was no air on the moon, my dear Baron. I am real anxions

to have you tell me all about it."

"Of course, I will tell you but let me see, where did I stop last night..... Oh, yes..... I believe my power gave out when I told you of my first impressions after the "Interestellar" left the earth behind."

The moon overhead was full and we could almost see it grow larger as we rushed toward it through space at an in-credible speed. Professor Flitternix and I credible speed. Professor Flitternix and I had calculated that we ought to traverse the 240,000 miles separating the moon from the earth in about 104 hours. This is an average of 2,500 miles an hour and may seem excessive, but in reality it is but a low speed, as speeds go in the universe. The calculation is very simple, too, and well known to astronomers.

Nothing very eventful happened during the trip to the Flitternix. moden. was busy with astrompenica! Observations, while I was engrossed, with the machinery most of the time.

For the first hour after our departure from the carth we tried. 100 become familiar with the many odd phenemena which presented deemselves to us, due to the sudden, almost total, absence of

gravity.
The "fuleratellar," no longer subject to the attraction of the

earth, due to its gravity insulator, was only subject to the muon's gravitational attraction. But as we were some 200,000 miles distant from that leady its comparation feeble attraction had but little effect on our bodies in the inside of our flyer.

For, according to the law of gravitation, our 1,000-ton flyer weighted but 110 lbs, at this distance from the moon.

Flittergia was the first to find this out. He had been pointing to the planet Mars with his hard standard out toward one of the glass pertheles overhead. While I looked at this beautiful planet I suddenly heard Flitteralx exclaim. He was eying his arm in astenishment. It was still outstretched, but pointing slightly apwards; this is what happened:

On carth his arm would have fallen down to his side of its own accord by the action of gravity, the arm weighing, let us say, 10 to 12 lbs. Inside of the "Inter-stellar," with practically no gravitation, his arm weighed less than 1-10 cauge; further-more, our feet were still pointing toward the earth, where there was no gravitational attraction, due to our gravity insulator. The only attraction coming from the moon overhead, his arm may suffed slightly ap-ment by a force of less than one conce. To bring his arm in its normal position it was necessary for him to use his muscles, which he did with a foolish grin.
We then switched on the entire Marconium netting, thereby insulating us from

the moon's attraction also. We were range no longer subjected to any outside gravita-tional attraction of any kind. Still the "Internation," due to its momentum, con-libued to more forward in space with its

öriginal speed.

Some curious phenometric were now ob-served by us. The mass of the "Interstellar" being relatively small, its force of gravity was but very minute. When you consider that on earth this globe, with its volume of 600,000,000,000,000,000,000 tone,

estimates my body with 170 lbs. to its surof the "Intersection," with its 1,000 tons, in accord with Newton's law can attract my body with bot on infinitesimal fraction of a pound. Therefore, procedurily speaking. oll objects within our ther were without

thinight.

For a while we amused curselves with odd experiments. Thus I would lift up Flitternix with may little finger and place him on my outstretched paim; he weighed less to me than if he had been a child's balloon. Buster, my terrier, became care-less and started to jump around, with the result that he went clean up to the ceiling with a thump. His body being clastic he came down with the same speed as he had gone up. There was another thump and he went right back to the cailing once more with undiminished speed. He simply could not stop any more. He was like a rubber ball bouncing up and down. There being no gravitational force to retard his speed, only the air in the room as well as the friction of his budy against the coiling and the floor; this acted as a slight brake to take up his energy expended originally. It was, however, so slight that after he had bounced back and forth some 200 tiones, howling feightfully all the while, we took pity on him and stepped him with our hands. After that he became very careful in his movements and we found it wise to imitate him.

We had to move about very enutionally and very slowly; any attempt to walk quick, for instance, was disastrous. Like Buster, it was exceedingly difficult to stop outselves once started. We could, of course, walk on the ceiling or on the sides of the room with at equal facility as on the floor, for the reason that there is no "up" or "down" in free space. You could lay down must anywhere without danger of failing or even rolling. As our bodies had no weight, it mattered not where we lay down, either. Thus, stretching yourself one, with nothing but the sharp edge of a chair supporting your back, was as com-fortable as laying on your cot. You see you weighed nothing, consequently your body could not press down hard on any-thing, and for that reason you could not possibly feel uncomfostable on matter how

you rested. The most delightful experiment, however, was when I took Flittening and brought him to the center of the Tuter-etellar while he was sleeping. Taking my hands away from him he remained of course, where he was, i. e., suspended in midaly without anything supporting him. There being no gravity he could not fall down nor up, for that matter. 1 ther. walked on the ceiling and called him. In a few seconds he woke up. I think he must have been the most surprised man in the universe just then. He logan claw-ing the air and looked wildly about him; you see he thought he was still on earth and he imagined he was going to fall down! That goes to show how strong habits and instincts are. In a few seconds, however, he represented where he was and "sat up." He certainly locked hidderous sitting suspended there in midair beginting suspended there in midair beginting ging me to pell him either no or down. I was so conveiled with laughter at his helphysmess and the situation was so droll that I resolved to see the experiment through; for that reason I told him that I refused all assistance. By that time he had become interested in the situation himself and after thinking a little while he began ferking his body back and forward in the fashion of an acrebat on a swinging trapeze. This gave his body sufficient numerous and in a few seconds he had landed laughingly on the opposite wall."

I had listened to the Baron with amazement, but I knew that what he had said coincided with Newton's faw of gravita-tion. There was, however, one point which I had revolved in my mind and which was not clear so I commented:

What you have just related is certainly exceedingly interesting, my dear Baron, but there is one point I would like you to classidate: How did you maily effect the landing on the moon?

"Not so impatient, my dear, I was just coming to that. When at the end of the 100th legar we were but some 600 miles from the surface of the moon, which by this time had become so big that it filled up most of the sky overbead, we switched on the pertion of the Marchinen netting turned to-ward the moon. The other half of the net-ting, which heretofore had insulated as gravitationally from the earth, was then switched off. Now the earth began pulling us again and in a few minutes, with our mamentum expended, we were going earthward опес веоре.

Immediately we reversed the suggests in the Marconium wire netting, with the result that we fell toward the moon again. In this manner, by manipulating the Marconium netting, I could vary the speed as well as the direction of the "Internalitar" at will and within a short while we were

SYNOPSIS

I M Aher, on exceeding young scientist of Yackton, Mass, who others as his commany new as well as samiling inventions, for aftend of suppling a yet floorestel, owns the language 1 and o plays one plant in the country. One evening he bears atrange noises over his phones and insmelliately a sepalatellal votes as beard. It is Murchibanton, one or the greeton your and story religion of all simes. Midneithanean profiling hose is came shown than he fill not also have in came shown than he fill not also course of all simes. Midmehtaneen profisions have is came about then he did not do be 19797, as popularly thought, and he furthermore gives unrefurable proof that he home is on the moon at prefer b.

is an the mann at protect.

After warms to know why Minnishanusa mean to the fileon and now. The latter their explains here Provine periseated him and how be wrant error the the Alice, and secreted he contenting Stella in a wonderful manner. However, it was ann a complete success, so the Haron left Europe for America. He immediately commune a marking which is to take him into space to the mean. Minnishanus has discovered how to neutralize designed the investment of Electricity, and he appress this investment to his space flyer, the "Internation". The marking proves a success; it sespecule and is liked with connections speed towards the most.

Treis spire seasing in the Mar 1997s. Have Numbers With he surprises up 100, each Postparia.

but a few miles distant from the moor's surface. We carefully strained its rugged face with our glosses and we finally decided to make our landing in the plane known to astronomers as Mare Nubiam. This plain, which in past acons undoubtedly was part of an ocean, but new devold all water, measures several hundred psiles across and in some sections it has a very level approximate; mineover it looked sandy like a desert through our telescopes and we decided that we could probably make a successful landing there.

By carefully manipolating the switches controlling the Marconium wires the "Inter-scullar's" wide landing belt finally rolled gently over the velentic send of the mounand the fiver came to a dead stop 102 hours after leaving the earth,

It was a supreme moment. We were the first humans to land on the moon and we were naturally duite overgome with timetion for some time. Had I not been the first to conquer space and break away from

the earth? Was I not the Columbus of a new world, a world far greater than any explorer ever discovered? Had I not opened the door of the universe that had been locked to all mortals since the begin-ning of our little world? Had I not thrown off the fetters which chained learnanity to be poor, sordid planet for scons?

I think I had a right to feel elated.

However, hard work lay before us. For cruturies it had been the conviction of scientists that the moon was a dead world, devenil of any atmosphere, water and vegetation. Of course, in the absence of these three necessities life could not exist. This we realized only too well, but at best the earth's scientists had no absolute proofs: after all, their conclusions were but theories, although very plausible as well as convinting theories.

'Knowing all this we proceeded very circlully. The first test we made was caucally to ascertain if there was any atmosphere on the moon. This test was very simple. We opened a small stoppork leading to the outside and we then listened with strained cars. We had tried the stoppock test out in space middle air. tween the earth and the moon and the air had been drawn out with a load biss. While we were listening now there was no hise, but we could feel the air being drawn out strongly from the "Interntaliar" when placing the finger on the opening of the stop cook.

From this we concluded that there must be some kind of an atmosphere on the moon, although probably a very ranched one. This relieved our anxiety immensely one. This refleved our anxiety immensely and I suggested at once to test the lunar-air on Professor Flitternix's cauxry land,

Pec-Pix.

This was met with violent opposition by Flittern's, who made the counter-suggestion to try it on the dog first, the dog being Buster, my fox terrier. This suggestion was not met with wild enthusiasm by myself either, and a deadlack followed. Finally, however, we drews lots and I lost. Buster therefore was the first terrestrial being to inhale the lunar atmosphere.

With a heavy heart we placed him into the elector and closed the door behind him; he was now in the air lock. By moving two levers the outside door of the ejector was opened and Buster was in the moon's armosphere. In another second he had bapped to the ground, anxiously watched by us through the glass plate particoles.

We saw him smilling at first, wherespon he began coughing violently for some minutes. After that he seemed to become quieter and he commenced to walk around in a curious, excited manner, as it under

the infinence of a drug-

We could not understand this, but contiated watching him with concern. in an hour, in never, he seemed to have become acclimatized and he behaved nor-

I reasoned that if Buster could stand it we could, and I said so to Flitternix. The professor was of the same opinion and we decided to risk it. We opened the four carefully, leading to the cutside, drew a deep breath and stepped out. In another second we had builded on the moon.

The first separation was a strong ringing in our ears and the carious sense of lightness of our bodies. The latter sensation, however, was not now to us, as we had experienced it already in the "Internation," due to the absence of gravitation. We now took a careful breath and started to cough violently at once. Nor could we stop it at once. The "air" which we labeled at once. The an eage 122)

Electricity Helps to Heal German Soldiers Wounds

HE photograph shows a number of wounded German soldiers under expert treatment in a hospital for the wounded. As will be seen, some of the soldiers have their arms inserted in an electric heating oven, and it has been found.

that this heat trentment acts very re-markably to remove stiffness from the joints and muscles.

The temperature of these ovens is very carefully watched by means of the thermometers, and the soldiers receive this treatment at regular periods each day until they are thor-oughly well and ready for the front again.

The electric overs shown have been used considerably in hosmas with great suc-cess. They comprise an electrical healing element essentiosed of a wire of ribbon re-sistor, which becomes heated to different degrees when the electric current is applied, depending upon now the different sections of the heating element are conaccted to the line wiret.

As seen, each heat-has a marble switchboard on same which contains the different switches for adjusting the amount of current used, and

which, in turn, permits any degree of heat wanted to be had readily.

Some of the electrical ovens for this per-pose are much larger than the ones here illustrated until are adapted for heating the entire leg. etc. Also some of the evens

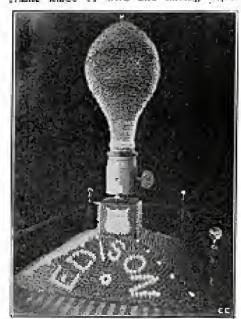


Photo (C) by Underwood & Caderwood. The Raises's Wounded Soldiers Make Use of Clerisis Ovens to Limber Up Their Stiffened magnet.

are built in such a shape that the abdomenor back of the patient can be heated as

ELECTRIC BULB COMPOSED OF 16,000 LAMPS.

A hege electric lamp, herewith alsown, was built for the Cincinnati Exposition in 1888. This lamp onesisted of a form or frame made of wire and having 16,000



Carly Edison Exhibit in the Form of a Monster Lamp Bulb Containing 15,000. Regular Size Bulbs.

electric lamps festened on it. The "fila-ment" consisted of a 3-inch pipe best in the form of a regular filament, and red

electric kimps were built upon it. When the red lamps were lighted their rays penetrated the glass of the outer electric bulbs and gave the appearance of a real gigantic lamp. This photograph is from the won-derful collection of William J. Hammer, the entirent electrical engineer and for many years; the associate of Timoras A. Edison in the development of the mean-descent lump.

SELF-INDUCTION OF SOLENOIDS OF APPRECIABLE WINDING DEPTH.

At the April 23 meeting at the Imperial College of Science, London, a paper by 5. Butterworth was read having the above

The existing formula for colls of this type, viz., those of Rosa and Cohen, of the U.S. Burcou of Standards, Washington, D. C., are shown to be inaccurate, the error amounting to one-lifth of I per cont. for the best formula when the winding depth is one-terth the diameter of the coil. For greater winding depths the error is larger. The imageuracy in Rosa's formula is due to the neglect of curvature in correcting for thickness, while in Cohen's formula the error is due to the approximate neglect of development. New formulae are developed by methods which are free from such approximations, and which apply to any coil for which the length is greater than twice the diameter, and the winding depth is less than one-tenth the diameter. These formulz, are capable of giving eight-figure accuracy. Simplified formula are also given which are suitable when only four-figure accuracy is required,-The Electrican, LonLOCATING SHELL FRAGMENTS IN WOUNDS.

A method of localizing shell fragments

or other pieces of magnetic material in the human body, which has recently been tested in France. Is moved in the Engineer.

A powerful alternate ing current electro-magnet is brought near the region affeeted, and the prescivor of a magnetic body within the flesh is indicated by a per-ceptible trembling of the surface at the immediate locality, By feeling the flesh the surgoon can easily find the spot where the trembling is strongest, and can thus locate the fragment of projectile, with considerable ac-Caracy.

The action of this alternating current method of locating pieces of iron or steel which may become buried in the flesh, is, based upon electromagnetic induction set up in the iron particles or iragments, due to the powerful alternating magnetic field of flux created by the A.C.

The pieces of from thus numifiest magnetic qualities, owing to

the current set up by induction in them and, of course, will also manifest movement, the same as the action taking place in an A.C. motor, etc.

Other methods in use consist of the X-Ray, the Induction Balance, etc.

action to hold the attention of the public, is



Destric Sign in New York City Featuring the "Boxing Boys" of Perceknit Feate.

shown in the illustration herewith. This sign is one of the many marvelons attractions along the "Gay White Way" of New York City.

THE FRIAR'S ELECTRIC LANTERN.

A new electric langua berrivith Elastrated was recently out on the market. The lantern has the shape of an old-style oil lamp in which the oil fuel has been substituted by the modern dry battery, thus



Nest Electric Battery Lump Known as the "Prior's" Lanters.

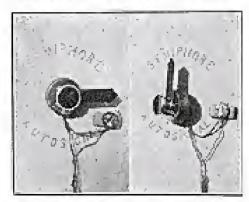
eliminating the accompanying dirt and donger occasioned by the use of oil.

The bactery of this lanters is guaranteed by the manufacturer to give use hours continuous and 10 hours interestent service, and while the fuel is not quite as cheap as in the old-style oil lanters the compensating features of neutrons and safety in the new Friar's lanters make the difference in that well worth while. A handy switch on the base enables the user to turn the light on or off.

A telephone call is ordinarily answered to-day in from three to live seconds. In the first exchanges it required from two to three minutes, and often a great deal longer. Such service would stagnate the present business world.

ELECTRIC SIGNAL FOR AUTO-MOBILES.

An electrical signal to show the discetton in which an automobile is to turn at street corners has been invested by a California man. An arrow-like indicator arm, rotat-



Two Views of New Electric Automobile Signal.

able from a normal vertical position to either right or left and operated by electromagnetic gonered, indicates the direction to those in the rear that the vehicle is about to veer off in. An electric lump at the hilt of the reflector blade adds to the useful-tess of the device at sight.

PLAYING CHECKERS BY TELE. GRAPH.

Exciting checker games by telegraph are not incommon, and after the heavy work in the slepats of many. Western railroads has been transacted and the weary night operators return to their rooms to seport the train either departed or passing by, the sounders click off mysterious numbers, which recently have been solved as checker tournaments by wire, the contestants being telegraphers located many miles apart. Many those checker games are in action over their railroad divisions.

The accompanying photograph shows the

The accompanying photograph shows the operator putting the telegraph to good adventage in a very exciting game. The system used is very simple. As ordinary checker-heard is nearless from 1 to 32, inclusive. Two sets of checkers are used by each operator. At the start of the game the operators decide on who is first to move. The their mover clicks off in the Morse code as follows: "14 to 10, or 13 to 18," or vice versa, or arrording to the operators decide in advance whether they have selected the red or black. When a king is made it is flashed over the wire, and although the confestions are for apart.



Playing Checkers by Telegraph.

yet the game is as interesting as if they were scaled apposite each other at the same table. Frequently other operators along the line put their boards in action and works the game by following the numbers as they come over the wire, moving the checkers on their boards accordingly. The operators say it is a great pastime.

TIFFIN RADIO CLUB.

A new radio organization was organized recently in Tirliu, O., with five charter mambers and has great promise of rapidly enlarging its membership.

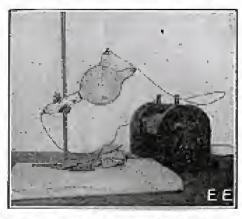
The officers elected are: President, John Chessman; vice-president, Prod Frederick; secretary and treasurer, Happid Buck.

It is desired that all wireless experimenters living within communicating range of this circl correspond with the secretary in order to widen the influence and activities of the organization.

Black asphaltum is excellent for pointing wireless instruments on account of its good insulating qualities.

THE STUDY OF FLOWERS WITH THE AID OF X-RAYS.

The applications of the X-rays to the study of phenomena invisible without their aid continually sucrease in number. One of the latest scientific uses found for these rays is in studying the inner structure of flowers and fruit huds. In some respects this is a better purched then dissecting for



Studying Flower Greater and Structure by Menns of the X-Ray.

the study of certain parts of plants, especially while growing.

The photograph here shown is that of a rose being expensed by the aid of X-rays which are produced by the X-ray tube placed above and connected to a high-tension induction coil. The flower is placed on a box, which may be a plate-holder, containing the photographic plate.

Although most electric motors contain iron cores in their magnets some motors do not have any iron in them, as those, for instance, used in recording watt-hour poters.

It is now possible to transmit and receive eight distinct telegraph messages over a common circuit of two wires.

A FLASHLIGHT FOR THE PENCIL.

While there have been many novel opplications made recently of the electric dashlight, probably one of the most useful for literary people, such as reporters, etc., is that shown in the illustration, and embodying a complete miniature electric flashlight with battery, adoptable to a neeril

with battery, adaptable to a pencil.

A simple-switch on same mables the user to utilize the light whenever desired. This device is extremely small indeed and can be carried in the pencil pocket without any



This ideal Percel for Reporters Corries a Small Block Light of its dwn.

undue bulging. One lastery will last a few menths with ordinary use. Such a percil light is just the thing for taking down notes in theaters, where the auditorium is darkened; besides, it has many other useful applications.

LUMBERING TELEPHONE SIGNAL SERVICE. By Frunk C. Persias.

The accompanying illustrations, Figs. 1 and 2, thus the telephone scincement of the signaling systems used by himber producers employing the long hand or pull boot medical of skedding. This is said to be the ethicisest and only positive made of signaling between-drum man and tong man, and it is posited out that instantaneous and accurate signals by telephone assure increasal efficiency and decreased expenses.

It may be stared that every large lumber producer in the country, especially those using the our-hard system of logging, either the ground or cableway skidders, has been sorely pressed for an efficient method of signaling, which would be both positive and installiancous, between the tong man in the woods and the drain man on the skidder. Every conceivable way has been tried, as, for example, the whiche signal, in which a string or cool is dragged out into the woods and is pulled to blow the whistle on the skidder. This has also been tried with a hell instead of a whistle.

Railmond signals were experimented with and, last of all, hollering was tried. This was done by placing a signal man or flagman mear the tong hoolers, who could signal to a man local before honored the enginemen. After annuerous trials, each was thrown aside as useless. Still, some companies are doing the last thry can by combining the railroad man the hollering signals, to these are far from satisfactory. Some companies have even given up the out-hard idea, on account of the back of peoper signaling apparatue. Every legiperman knows just how slow and inaccurate these mucles of signaling acc. especially where the out-hard skidder is in use.

There has now been designed special telephone instruments which have solved the problem of signaling for the hunterman. By means of this system the tong man and drum man can talk to each other at all times, regardless of whether the skidder teging is ruseling or not, and it works successfully whether the tung man be 100 feet.

or 4.000 feet from the skidder.

The telephone service consists of a steel ser dram, placed or mounted on the skidder, together with the instruments. On the dram are 2,600 to 1,000 teet of strong

At Left; Pip. c. Lamberman Using New Type Telephone Especially Besigned for the Parpuse.

Below: Fig. 1. Lumbermaria Type Telephone Recently Pat on the Market.



heavily insulated wise made for this perpose. There is continuous convextion at all times through this wire by means of a brass commutator.

The head relephone set is cosmected by a plag and jack, and can be disconnected in-

ELECTRICAL NOVELTIES FOR THE BANQUET TABLE.

By Fells J. Kech.

Down Cincinnati way bastesses do seem to possess the knick of getting up novelsles—things that will appeal and yet which are different from anything anyone may have seen just exactly the same theretofore.

So not long since, when young Jack Roose was to celebrate his graduation from the medical college at the Ocean Ciny and this with a hangier to his friends—his hig sister, to where he left perangements, causpired with the toy dealers and the electricians of the town, with results as

the town, with results as shown in the picture.

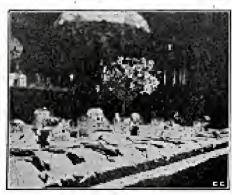
Up at the table center there was a great bowl of cosmos—just a plain vase, it sreamed—and you never would guess that the base of that vase was an inverted bowl, or cove, within which a central plug could be placed for wires radiating out from between the grooves of the design on the vase, Five minutes' survey of the changest vases in any china store will supply you with such, of course.

These little elegatic wires

These little electric wires - neatly insulated with green, that could be concealed be-

meath the flattened ferms on the cloth or among the lines of smiles—led, each in turn, to an inexpensive skull of papier-marks, supplied by the toy store, and there is up a wee little built light, alternate redichen deep green.

These skulls in their turn were placed



directrically Lighted Skulls, Figures, etc., Alaske a Novel Burgupt Table (Replay.

upon paper ningkins of Hallowe'en patterning—with'es, dask nights, Jack o' lanteens—likewise from the toy store. Otherwise, lesus and smiltse, a carmation for beaton-niere at each place, and the table was done.

When ready for serving, all lights save those in the wee skulls were extinguished. The little lamos cast their subdued rays through the hollow eyes on the place-early beneath; and by nid of these, and these only, the young 'encodless' found their places and enjoyed their lists course—the inhits one of a season of revel and for The picture shows the table ready for the guests.

stantly. This set is very light and leather-covered to protect it from steam, grease and spacks, and is never in the way of the dress; man when running the engine, and allows him to have both hands free. No latteries are used with either set, so the case of maintenance is practically nothing. They work on the permanent magnet 5%-

A NEW ELECTRIC DISHWASHER.

A leave electric dishwasher has recensly been placed on the market.

Fig. 1 shows the dishwasher permanently

Fig. I shows the dishwasher permanently connected in a kindam. On the shell at the left a rack of dubes is seen ready for washing. At the right a basket is shown in which plasses and silverware are placed.

In Fig. 2 the interior of the machine is shown with the rack of dishes and the



Fig. 1. Electric Dichwaster Installed in Modern Kitchen.

hasket compaining the glasses and silverware in position,

Bruezch the circular tank a M-horsepower electric motor is direct-connected to a small centrifugal permy, which forces hat sough water through a perforated pipe in the cruted of the mathine and out over the dishes until they are perfectly clean.

The dishes in the machine being above the water leve! and in a vertical position, the water drains, off, while the escubined heat from the direct contact with the bot water and the contained heat in the tank dries the dishes.

During the cotine operation of washing, rincing and daying, which takes less than five minutes, the dishes remain stationary

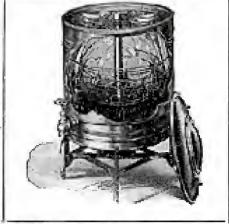


Fig. 2. Sliewing Dishes Placed in Electric Dishesance.

la the machine, thus eliminating any danger of breaking or chipping.

tem. Either party can call. Should the tonig man desire to talk to the drum man while this plug is out, he can be signaled by pushing the button and terming the crans on the field set, which will ring a bell inside the skidder set, notifying the dramman that he is wanted. He can then plug it and talk

AN "ATTRACTIVE" OLD MAN.

Different from the immortal "man with a looe" is the man pictured in the illustration, who is kept busy walking around the yards of the Willys-Overland Co, at To-ledo, O. By means of his trusty seed mag-net secured to a shovel handle he mun-



"The Man With a Magnet" Picks Up All the Natis, etc., in a Western Auto Plant's Yord.

ages to keep the roads about the auto plant clear of small iron or steel fragments which might puncture the auto tires. The magnet piece up all the mils, chips, etc., and which are then removed from the magnet and deposited in the pail.

HOW TO PRESERVE YOUR ELEC-TRICAL EXPERIMENTER.

No doubt many subscribers to The Electrical Experimenter keep the back numbers for future reference for the purpose of constructing histraments described in them, etc. Frequent handling while looking up the desired information soon renders the magazines ragged and worn.

To prevent this, get some manifa paper folders, such as are used for music, and place the magazines in them. One or most copies may be put in each folder, as de-sired. Mark each folder so that you can see which copy or copies are enclosed. Then arrange the folders in the order in which the magazines were published.

This method, in conservation with a cardindex, saves considerable time in limiting up any instrument or apparatus described m any issue, at the same time preserving them. Contributed by

WILLIAM E. SCHMOLL

Dry cells should never be connected up with accumulators; the effect of the arrangement might be expected at first to light the lamps to an unusual brilliancy. Very quickly, however, the dry cells will become exhausted and then they will act as a dead resistance to the passage of current from the storage fixtury to the lamp.

A PHONOGRAPH-TELEPHONIC LECTURER,

An exceedingly ingenious phonographtelephonic lecture system has made possible a wonderful reproduction of the Panama Canal at the Panama-Pacific International Exposition. This remarkable replica of the small gives the visitor a more infimate perspective of the cotice Canal Zone than is perhaps possible by a trip through the canal itself. This canal is miniature, covers an area of four and one-half agree. and is accurately and minutely made to the rmallest detail.

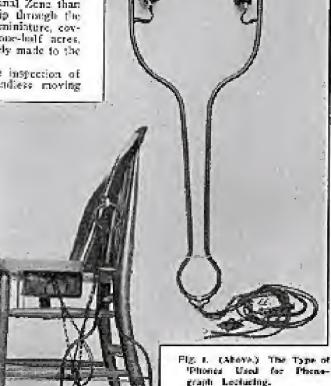
In order to facilitate the inspection of this gigantic model, an endiese moving

navigates it. platform is The 1,117 feet long and con-sists of 144 cars, which are propelled by electric motors. Kach car is equipped. with seats for the Passongers and cash seat is equipped with a pair of Western Electric watch case phones at-tached to an ad-justable handle, through which one can hear a continuous descriptive leesure as the trip is made around the conal model. Fig 1 shows the type of phones used. This special type of han-dle was designed so that the specialors would not be obliged to hold their arms in an uncomfortable and tire-

some position, and to prevent the necessity of semoval of hars on the part of the ladies. Fig. 2 shows the telephone equipment installed on one of the passenger sents.

Fig. L. (Al Left.) Telephone Receivers Installed on Passenger Scal.

A telephone transmitter is connected to an Edison phonograph, which contains the feeture and reproduces it into the transmitter. This transmitter is connected to



62 receivers, and thus 42 passengers are connected with one phonograph, are four of these units in the system. This is the modern way of lecturing.

AN ELECTRICALLY HEATED SHOE-TREEING IRON.

The electrically operated shoe-treeling from or "Calorel" re-laster, as it is called, which is illustrated henowith, is designed for use in retail shoe stores and cent beoperated from an ordinary lighting socket. le consista of three parts rigidly fastened



A Flexible Electrically Heated Re-Laster for Strage,

together—the highly polished brass tip, the heating element, and the handle, which is of hickeled-steel wice. The brass tip weighs I pound and is able to store a comparatively large amount of heat. The device is expripped with 10 feet of flexible cord and a detachable plug, and takes 50

watts. At the average price for electric current it can be operated for less than buff a cent per hour. It should be of great service to all shoe dealers in adding them to make slaves look and fit their pend.

TO DISTINGUISH DIRECT FROM ALTERNATING CURRENT.

In case of uncertainty the following very simple method may be used to ascertain whether an electric lamp is supplied by direct or alternating current. Stand at sense distance from the lamp and wave a stick in and fro between it and the ph-server's eye. If the current is direct (continuous) no distinct intage of the stick will be seen, but only a blue. But is the current is alternating there will appear so be a number of sticks. This is due to the fact that: an alternating current reaches a maximum and falls to zero in very rapid succession. A similar effect may be ob-served in a darkened room if an induction coil with bright sporks passing between the terminals is substituted for the lamp.

The energy freed by cooling one spann-int of water ow mytree would operate a telephone for ten thousand years. baby gerrent of electricity must take a voice 3,400 miles, and it cannot be inereased or its power to transmit specali is gone.

LOCATING BURIED PIPES ELEC-TRICALLY.

Where will we strike an underground pipe? The hapturard plan of drilling and chopping the soil has never been satisfactory, and some means of determining the presence of underground pipes before bor-ing into the soil have been sought ever since underground pipes have been in general use.

An apparatus which will determine the exact location of metal pipes, conduits, cables, cic., that are 12 feet or less under-ground is shown in Fig. 1.

The apparatus consists of an induction coil delivering a medium voltage, batteries, telephone receiver and an exploring or

feeling coil.

The apparatus is used as follows: Terminule of the instrument are attached to a pipe at some accessible point. Then the operator holds the exploring coil in his hand as shown in Fig. 2, and holds the receiver to his ear. He now walks about, holding the exploring coil dear the grounds (business



ig. 2. Proper Sethed of that the pipe is Handling Capbring Coll within this area When Tracing Path of Pipe. where he stands.

then started on the The launereal. ming of the vibraint is leard in the receiver, but as supporting the opcrator comes anywhere within the area enclosed by any pipes the limmming in the re-ceiver will de-crease, and over the pipe no limit at all will be heard. The operator then knows

The whole device is portable and can be carried about readily. It operates on batteries and sells at a seasonable price.



Fig. 1. Electriculty Operated Inductive Type Buried Piec Finder.

Russell Hoffman, of New Lexington, Ohio, writes he:

"I received my first issue of "The Electrical Experimenter and think it is the best magazine I ever read."
A. S. Burleigh, of Great Falls, Mont.,

writes us as follows:
"The Electrical Experimenter has suce been worth 50 cents during the past year,"

Tungsten lamps give about three times as much light for same current cost as carbon lamps.

Liquid air boils water and burns violently when ignited by a match.

THE BASE OF ALL ENERGY. THE SUN.

In this age of scientific wonders, we are perhaps, at times, apt to forget where the base of all energy in various forms is located. This central dynamo, if so we may

term it, is the Sun, which is constantly giving off energy in the form of very rapid heat waves, transmitted through tise ejedium we new call the other. The exher transmits light, heat, wireless and other wares by vibration according to the accepted, theories now and when a body interpepts these waves they angulfest themselves ome form or other,

Says D. Albert Kreider, PiaD., of Yale Univer-sity: "All heat, pateral or actificial, is exaccable to

the sun as the original source By the ancients the sun was regarded as a huge

ball of fire.

When one remembers what a small speck in the universe the earth is, and how for it is from the sum. it will be evident that the castle can intercept only an infinitely small portion of the total heat which the sum radiates. Nevertheless, at the earth's surface this is at the rate of about 7,000

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FINAL CALL

Beginning with July 1st the emb-scription price of THE ELECTRI-CAL EXPERIMENTER goes to \$1.00. It is to your interest to sub-scribe now while the price is to long. THE ELECTRICAL EXPERI-MENTER is the greatest value to-day in Electrical Literature. If you intend to subscribe to it, do it now. One year, 50 cents; 2 years for \$1.00, 8 years for \$1.50. 5 FEARS for \$2.00. (Ferrige foctage to be

horse power per sere! How then can such an enougous loss of heat by the sen, without cooling, be accounted for?

The answer is that the sun is constantly

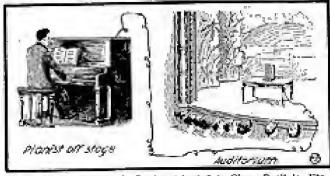
ogneracting.

Anyone who has ever pumped up a bi-cycle tire knows that the compressing of a gas, heats it. Now the sun is still gaseous and is compressed by its own enormous force of gravitation. This force is \$7.6 time; as great as that of the carch. To Shisterie: a person whose weight here is 110 locunds, at the surface of the sun, would weigh 1% tons. But the sun can eontinct only as it loses heat; and thus it provides a nice balance of forces which maintains the temperature. Obviously this contraction can not go on indefinitely. It has, however, gone on for hundreds of millions of years in the past and may continue for millions of years to come.

The sun is an emormous mass, 866,500 miles in diameter, which is 160% times the diameter of the earth. Colculation has shown that a contraction of only 250 feet per year is sufficient to account for all of the leat energy which it radiates. At this rate the contraction could cominue for 9,060 years before the most powerful telescope could detect the consequent change in its diameter. It must be remembered that the earth is 93,000,000 miles from the SHEET.

THE MACROPHONE OR LOUD SPEAKING TELEPHONE.

Loud talking telephones are always in great demand for various purposes, one use for them being illustrated in the sketch here presented, where piano music is transmatted electrically over a wire to a thea-



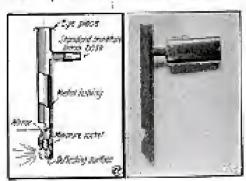
Long Talking Telephonic Device Adapted to Plana Recitals, Etc.

ter, or vice versa, etc.
The Macrophone loud speaking telephone is a radical departure from the usual form of such apparatus, as the diaphragm is comprisod of a thin wooden panel suitably sup-ported in an acoustic sense. This wooden membrane is caused to vibrate and sets up sound waves by a powerful set of electromagnets acting on a lever recured to It. The lever is given resiliency by means of a strong rubber band, and thus no rigid connection exists between the diaphragm proper and its actuating magnets.

This loud speaker will transmit regular speech, music, phonograph sound, etc. and operates on eight dry cells, which will last for a period of three to four months. A microphone is generally used in the disouit, but for plano music transmission, such as abown here, the wooden displicagin is rigidly connected to the plane sounding board by a wood pin gland between them. The Macrophone acts as transmitter or re-

AN ELECTRICAL INSPECTOSCOPE

A handy and neat instrument for inspectors, automobilists, engineers, machinists and others is the Crane inspectoscope, illus-trated by the half-tone and detail sketch.



Sectional View and Expernal Appearance of the "Inspectoscope." Heefut for Looking Around Genera Wills.

It works on the principle of optical reflecsion, and, as the details indicate, use is made of a small flashlight lamp placed at the base of the take. Hence in dark corsters the lamp, which is lighted by sevening the attachment plug into any flashlight case. illuminates the object, and its intage is viewed by planing the eye against the eye-pace at the top of the tube. The device is small in size and couried readily in the cost pocket. It is extremely useful in locating oil and carlon deposits in gas engine cylindens, small parts, screws carclessly dropped into some intrincte machine, wires being 'fighed' under flooring or in walls.

POWERFUL MAGNET DRAWS STEEL FROM BODY.

The removal of pieces of shrapnel, stelljacketed bullets, steel shavings, etc., by the use of powerful electromagnets in hospitals abroad has been acclaimed by many news-



Powerful Electromagnet Drawn from ar Steel Chips From the two cities.

impers as the very latest application of science to surgery. It is interesting to note that the Westinghouse Electric & Mfg. Co. has installed in the relief department of its Fast Pittsburgh Works a magnet for re-moving metal imbedded in the flesh, which is one of the most powerful in the world.

The magnet is mounted on a hox containing the resister, which is used to regulate the amount of current flowing through the rolls. It requires 4,000 wants for its operatime, or enough power to supply 199-82 C. P. Mazda lamps.

It is not an infrequent occurrence for steel and iron workers to get bits of metal in their eyes or hands. Previous to the intheir eyes or hands. Pervious to the in-stellation of a magnet the only means of removal was by probing, a method which is as uncertain as it is painful. Since this electromagnet was put in operation it is a very simple proceeding to extract such particles. The portion of the body in which the foreign particle is embedded is placed near the pole tip of the magnet, the switch closed, and the magnet does the rest. The pote is removable, a num-ber of different shapes being supplied for various classes of work. various classes of work,

It is very common for flying bits of metal to lodge in the eye. Should they strike with force enough to become imbedded the removal, without the aid of a powerful magnet, is apt to be difficult as well as painful. The protecting coating of the eye must be cut, and there is dauger that instead of removing the particle it may be pushed further into the eye. When the fereign body is case within the cyclall it is properly a case for the specialist.

Steel workers (requestly have their hands purctured with minute pieces of metal, which become imbedded under the colloured skin. If these bits are allowed to semain the wound is likely to become infected. The use of a powerful magnet fasures the removal of all traces of from from wettings. in the hand or any other part of the body.

Some remarkably small pieces have been extracted in this way, one recently recovered being not une-twelfth of the thickness

of a delicate needle.

Dr. C. A. Lauffer, modford director of the Westinghouse company, relates a num-

her of instances in which the magnet has proved invaluable. Among these is the rather amusing ease of a Workman who et-tempted to drill one of his own seeth. The drill broke off about half an inch item the end and remained in the cavity and it seemed as if the only way to remove the dril, would be to pull the loots. However, a special extension was made and litted to the magnet pole. ston 4.5 the extension was brought in contact with the drill and the current switched on the drill was immediately dsawn out.

The American Telephone & Telephone & Telephone to and associated and connected companies are now giving service to 100,006-000 people by means of \$0,000,-000 telephones and 21,000,000 miles of wire.

The voice by telephone travels from New York to San Francisco in I-15th of a second, traveling at the rate of 56,000 miles per second. The voice of a man speaking in New York is heard in San Francisco three hours earlier, that being the difference in the slandard time of

AMERICA'S VICE-PRESIDENT TRIES ELECTRIQUETTE. By PELIX A KOCH.

No, there are no herable to proclaim, with somerous: "Oh yez! Oh yez! Make way, † * " make way! The most excellent, the Vice-President of the United States"; but, instead, you hear the jingle of a Sinte electric call-bell, then the soft when of rubber tires, and to, the Vice-President of the United States of America has some by in an electrometric.

has gone by in all electriquette. Of course, chances are, you do not know what an electriquette happens to be. Jac'e Roosa, who's been down to San Diego to see, tells us that it is a comfortable, two-

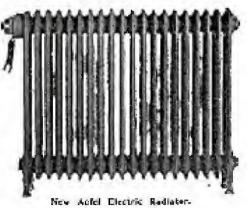


Vice-President Marshalf in an "Historiette."

seated sedan chair, fitted with much the same apparatus that drives an electric auto-mobile. Only, it is simpler—so very much simpler that a mere child can operate it. So fired visitors to the hig fair seat themselves in it, start on their journey and are soon whisked to where-so-ever they'd go; enjoying a much-needed rest maybay the

ELECTRICALLY HEATED RADIA-TOR.

A new elegatically heated radiator has recently been put on the market. The heating elements are inserted through the bortom and top of the radiator. This ele-ment is divided into several sections and is connected to a multiple-pole switch which can either be attached directly to the radiasor, as shown in the illustration, or placed at any convenient polm disired. The con-



samption of energy based on a square foot of radiating seriace is 30 watts to 35 watts en high heat, 15 water on medium heat and d watts on low heat, giving a radiating temperature under normal weather con-ditions of approximately 200 deg. Pahr. on high heat. The amount of heat gencrated is controlled automatically by means of a thermostat.

A NON-MAGNETIC YACHT.

The "Caracegie," the yacht employed to make a magnetic survey of the earth, has just reached Honolula after having passed through the Pansma Canal. From these the staff will make magnetic observations in the South Pacific Ocean. These include the magnetic declination, the horizontal dip and the intensity of the magnetic field, together with studies of atmospheric electricity. The "Carnegie" is non-magnetic being built of wood with least spikes and copper sheathed below the water line. The auxiliary engine and all stoves are of copper; the 1,400 pound anchor is bronze; all metal fixtures are of nyramuzguring material; all-brass lamps being used through-

FOR WOULD-BE CONTRIBUTORS.

If you've got a shought that's happy, Boil it down.

Make it short and crisp and snappy-Boil it down.

When your brain its coin has minted, Down the page your pen has sprinted, If you want your effort printed Boil it down.

Take out every surplus letter -Boil it down. Fewer syllables the heller— Boil it down. Make your meaning plain: express it Bo we'll know, not merely guess it; Then, my friend, ere you address it Boit it down.

Boil out all the exten trimmings-Boil is down. Skim it well, then boil the skimmings— Beil it down. When you're sare 'twoold be a sin to

Unt amother sentence in two, Send it on, and we'll begin to Rest & down.

-"Gumphion,"

July, 1915

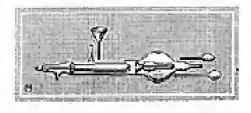
MINIATURE HIGH FREQUENCY

One of the smallest practical high-fre-quency muchines, and suitable for either direct or sitemating morest circuits, known as the Violetia, is illustrated here-



Above: New Pertable High Frequency Set Which Fits the Hand.

Relaw: Ozone Generator for Use With Set Aftern Shown.



with. This apparatus is so small it can be held in the land while in use for gen-erating high-frequency currents. The com-plete outlit, suitable for use by appone. includes several treatment or application rubes exhausted to different vacua.

Owing to the special design of the vi-leating interruptor on this device the ac-

tion of same is very steady and uniform.
For those desiring to take osone treatment a glass ozone generator is furnished at slight extra cost. It is seen in the illustration, and this instrument generates enormous quantities of exent, which is purified by passing through a mixture of pine-needle oil and entalyptus, and is inected into the lungs in the form of vapor

by agitating the rubber bulb.

The treatment is very pleasant, and amazing results have been obtained, it is said. The ozone is driven directly into the lungs, where it is distributed throughout the body by the blood. In this way ozone inhalations not only have fotal effeets but have excellent tonic and constitutional effects. For this reason ocone is so effective in cases of hay fever, which is the result not only of local irritations, but is also the result of lowered vitality.

Ozone also acts as a powerful germicide and disinfectant, destroying the toxin products of bacteria through its power as an oxidizing agent. Quick relief and re-sults are stated as obtainable in cases of hay fever, assisma, rhinitis, casal catarch, colds, bronenitis, et ectera.

Time is electrically flashed from powerful lamps on top of the Metropolitica cower in New York City which can be read 25 miles away.

MARCONI RADIOTELEPHONY.

Mr. Marconi states that the Italian page is using his wireless telephone system as a part of its system of intership and intersquadron communication. In some instances, he said communication had been established between ships as far apart as 100 miles. At the present time, he added, his efforts were being directle toward the perfection of the invention for moderate and not long-dissance communication. He opinismed the report, that the wireless tele-phone would probably be on the market in the United States within the present year.

"Our new stations at Belmar and New Bronswick, N. J.," said Mr. Marconi, "are out of commission and will probably remain so ustil the end of the war, because of the taking over by the British Government of the two corresponding stations in Great British. The British stations are being used in long distance work, some of the messages being to points as far distant as Egypt. Our station at Marien Mass., which was built to communicate with Norway, is also out of commission, owing to the fact that Great Britain will not promit the exportation of the equipment and ma-terial necessary to complete the Norwegian

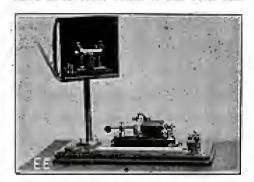
NAVAL WIRELESS IN JAMAICA.

Great Britain is erecting a powerful wireless station on the Blue Hills, near Kingston, Jamaica, according to latest re-ports. It is said the more station, which is 300 feet above the sea level, is intended to coulde the Admirally to send messages to the warships on the South Atlante

Naval officers stationed at Kingston state that if such a plant had been in existence at the beginning of the war it would have prevented the defeat of Sir Christopher Cradock's fleet and enabled the warships on the coast to have picked up the Karlstube and the Dresden before they éank se many vesséls.

TELEGRAPH SET THAT SIG-NALED AROUND THE WORLD.

We present in the illustration shown a reproduction of the fanous telegraph sounder, relay and key, as used a short time ago by Thomas A. Edison in sending the famous telegraph signal which circled the earth; repeating itself in the same office from which it had been sent

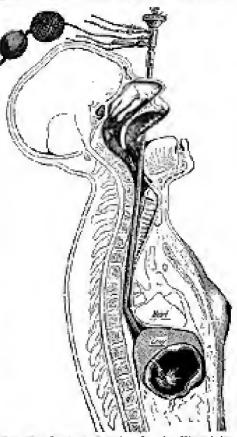


This Telegraph Set Signaked Through a 23,491 Mille Carcert.

out previously, but a few minutes before. Of course, this was accomplished by relaying the message through several cable stations, in the globe-encuring journey. This apparatus is one of Unitle Sam's high-ly pulsed exhibits at Washington. Edison began his wonderful career as a telegraph. operator, as have many of the present dosleasters in industry and science.

ELECTRICAL ILLUMINATION OF THE STOMACIL

When the physician nowadays wants to find our what kind of a surface your stornach has he has noter means at his dis-posal than the operating knife. Our illus-



How the Stemach Interior Can be Viewed by Using Small Electric Lamp and Suitable Jeinted Tube.

tration shows how the perfected stomach tamp and periscope works. The metal take of small calibre is passed through the patient's mouth and throat down into the stomach. By means of eleverly arranged reflecting mirrors in the tabe the image is observed by the physician at the outer end of the tube. Rubber bulbs are shown attached for various requirements. surgical operations are performed through such tubes listed with electric illumination.

MANY USES OF TUNGSTEN.

Tungsten is used principally as an allow of high-speed steel that is, steel used in making tools used in metal-turning lathes running at high speed to which it impacts the property of holding temper at higher temperature than eartign speels will. The now well-known dustile tangates is used for incandescent latops, which are fast re-placing earbon lamps. Resembly greatly improved lamps, in which the wire is wound in believe and in which the globes are filled with introgen, have produced a close approach to white light. These lange are turnished in candlepowers up to 2,000. Ductile tungsten is practically insuludin in all the common acids; its midling point is higher than that of any other metal, its tensile strength exceeds that of iron and nickel, it is paramagnetic, it can be drawn to arother sizes than any other metal (0,0002 linch in diameter) and its specific gravity is 70 per cent, higher than that of fead.

Li you are not a subscriber don't fail to темб анавишескаей чи разе 95.

New Lamp Signals on Pennsylvania R. R.

N entirely movel signal system, differ-ing in all respects from any ever before used by any stellment, was recently placed in operation by the Pennsylvania Railroad from Overbrook to Bryn Mawr, Pa. This is a portion of the section of the main line between Broad Street Station, Philadelphia, and Paoli, Pa., now being electrified.

The new signals are especially designed to promote safety, efficiency and economy. All moving parts are climinated from the signal apparatus. This not only reduces

to a minimum the chance of getting out of croser, but is also expected to lessent the cost of installation and maintenance.

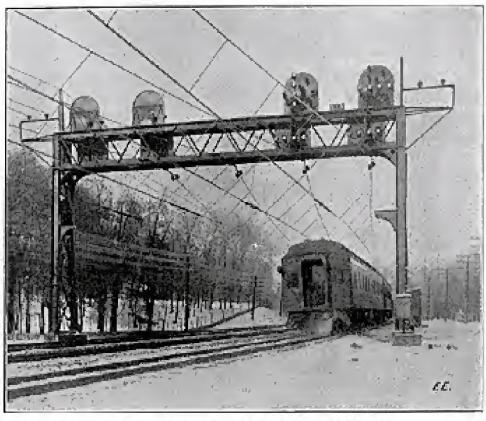
The same signals will be used both day and night. Engineeren will therefore be guided by the same code every hour of the twenty-four, with corresponding reduction All positions of the semaphore arms—horizontal, diagonal and vertical—are deplicated in the new signals by the rows of electric lights. Each seemal has a sufficient number of rows of lights to be the

To make the lights clearly visible, even in the brightest sunlight, the voltage used in the daytime will be tearly quadruple that used at night. The lamps can casily be seen in the clearest sunshine for more

than 4,000 feet.

So powerful are the lamps that when the full current is used at night it is possible. to read large type by their light at a distance of 1,000 feet.

Each signal will protect a block of track 3,500 feet in length. A train passing a signal will automatically set it at "stop," When the train reaches the next black the



Latest Ratificial Signal Employs Powerful Electric Bulbs Instead of Scinaphore Acres. Lamps Can be Seen 4200 Feet Even in Bright Sunshine.

of the chance of error. Necessity for dis-tinguishing between lights of different

colors is banished by using only white lights.
The feature of the new signals is the substitution, for day and night use alike. of brilliant white electric lights, showing sharply against a black hackground in place of the moving arms of the soma-phore, now used by day, and the colored lights used at night.

first signal will change to "caution." Another position of lights will show when two full blocks are clear and a fourth position when three or more are 1800cupied.

An engineman will always receive notice of a possible stop at least 7,000 feet in advance, and will receive two cautionary signals before approaching the "stop"

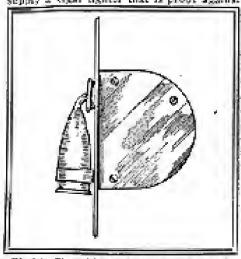
INTERRUPTIONS IN RADIO TRANSMISSION FROM GERMANY.

The Nauga-Sayville and Hanever-Tuckgrion transatiumie wireless systems, which have been transmitting the bulk of telegraph traffic between the United States and Germany since the cutting of the Emden cable, have for the past few weeks suffered severe service interruptions. though the plants have been found to be sufficiently powerful to interchange ates-sages, even by daylight, during the winter season, with the coming of warmer weather

(and the accompanying increase of "statie") communication has become impossible for a large part of each day. Sayville transmitter is being enlarged so Sayville transmitter is being enlarged so as to improve settling to Germany, but this will of course not aid reception in the United States. Many combinations of receiving apparatus are being tried both at Tuckerton and Sayville, in the kope of eliminating "static" interference to such a degree as to permit the German signals to be read. It is not known whether or not there will be any attempt to increase the sending power of the Nauco or Hanguer. sending power of the Nanen or Hanover station.

WINDPROOF ELECTRIC CIGAR LIGHTER.

Every smoker has experienced the diffi-culty of lighting a cigar or signrette in a moving automobile or motor heat. A match is blown out instantly and even a pocket eight lighter is extrapashed by the wind. To supply a digar lighter that is proof against



Clectric Cigar Lighter Which is Windpreed.

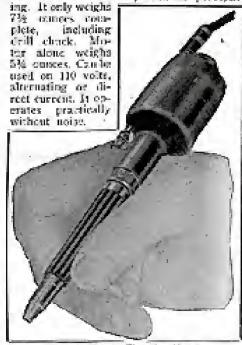
the strongest wind and that works automatically is the object of a finite electrical device that caused much interest at the re-cent Automobile Show.

It consists of a little knob langing from a cord. This is attached to the most conrement part of the woodwork and takes up scarcely more room than an ordinary push button. When one wants a light he simply pulls out the knob and the end instantly glows with sufficient best to light cigar or cigaredle, the cord being of suffi-cient length to enable one to get a light without changing position. On releasing the lighter the cord is automatically re-wound and the corrent automatically dis-connected. The lighters are attached to the dynamo lighting circuit or batteries and are made for any voltage.

ELECTRIC MOTOR FITS THE

HAND.

As extremely small electric motor is here shown, which is intended for dental strills and other work, such as perforat-



Lilectric Motor Fits the fines.

Many other uses for this extremely nead motor will suggest themselves to the coader.

ASTONOU THE CONSTRUCTOR



How to Build a Photophone

By Homer Vanderbilt

R. ALEXANDER GRAHAM BELL. the inventor of the electric telephone, was the first to succeed in manuficial sensed without the aid of any wire connection, although this method is not prantical, but is interesting and valuable many experimenters. His method of transmitting speech without wices will be described herewith, and details of constructing a simple photogeone will be given.

This instrument will work very well for distances up to 900 feet. Dr. Ruhmer, the German scientist, has made photophones that have worked many miles. The photophone herein described was built by the writer, who has used it successfully for American and executing the large test.

Referring to the details, the transmitter is indicated at Fig. 1, and the consultar reasoniter head A is made from soft word, transmitter head A is made from soft word, transmitter head A is made from soft word, transmitter head a lashe, to the shape shown. Any wood partier will turn it out for a small sum. The diafram B is an ordinary sin one from a telephone receiver, and one side is model placed and highly pollished; the reason for this will be explained later. The diafram is fastened to the head A by means of four small brass serves, at better, by a circular ring of wood. The supporter C is made from soft wood. The supporter C is made from soft wood. The supporter C is made from soft wood. The supporter C is made from the some material. Two small brackets are now fastened on each side of the supporter C, as shown. Next fasten the transmitter head on to the frame; this is done with two flat-brack brass serves. The mouthpiece and can be readily obtained in any electrical supply house.

The receiving instruments are now to be

The receiving instruments are now to be considered. They consist of a parebolic fellector A, selenium cell K, banery E, telephone receiver R, and supporting frame for the parabolic reflector and selenium cell. The reflector is purchasable at small cost or can be made from a tin, copper or aluminum bowl. The boad slenuld not be larger than 12 inches in dismeler. A small piece of wood B is made to support the cell K, and is held in place by means of three screws 1, 1, I, which are placed through

there holes made in the bowl.

The supporting frame C and base D are made the same as for the transmitter, with the exception that C is one inch longer, as may be seen in drawing. A small wood shelf B is added, which can be 1'x8', etc. It is strengthened by means of a pracket G. The parallulic reflector is next mounted in place. It is supported by means of an S-32 serew E.

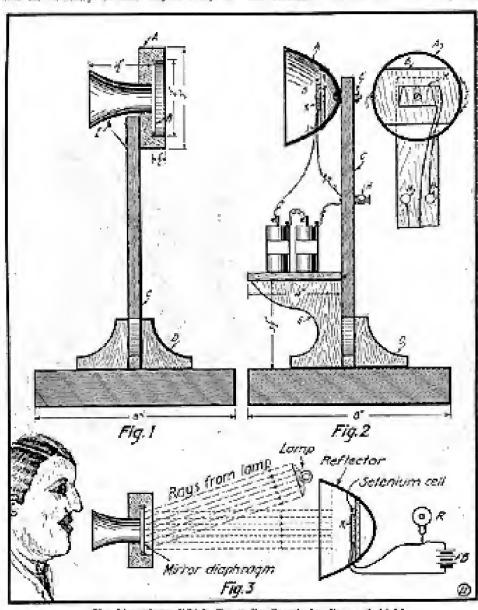
We now come to the most difficult part of the whole apparatus, and that is the adminimental. This can be either purchased from any reliable concern or clse made. A very easily constructed selenium cell was described in the August, 1914, Either trical Experimenter, and up further explanation is necessary brite.

The selentian cell is placed on the plate B and fastened to it by two screws. Care should be taken not to lighten the acress too tight or the selentiam will crark, which makes the cell worthless. The two terminals of the cell are brought through the bale J and one of the than is connected to one binding post H, while the other one is connected to two ar three batteries, which are placed on the shelf F. The other ferminal of the lattery B is con-

nected to the second hinding post IV, and a salephone receiver K is connected across these hinding posts.

The apparatus is now completed and ready to receive a good coat of heavy orange shellar. To operate this photophone it is necessary to place both transmitter and receiver as right angles to each other and an ordinary carbide bicycle lamp is

thin, highly polished diafram B acts like the diafram in the ordinary telephone; but instead of transmitting vibrations by means of varying the chelvic consent to the receives, it varies the degree of reflemed light, which strikes the parabolic reflector A and scienium cell K. This revisition of light causes a variation of the scienium cell, and since the telephone



The Photophone Which Transmits Speech by Beam of Light.

placed in such a monner that all the rays of light fall on the polished transmitting diafram B and are thus reflected onto the parabolic reflector A. Fig. 2. A good idea of how to arrange the apparatus is shown in Fig. 3. The writer advises the builder of this photophone to use it for about distances at first, and be familiarized himself with the working parts of the apparatus. By using a larger source of light, such as an one lamp, the distance may be considerably increased, of course.

For these who are not familiar with the principle upon which this instrument works, the writer has endeavored to show how this valuable and interesting apparatus operates. By referring to diagram 3, the

receiver and hattery are connected in series, the battery current is caused to vary and in this way causes the diafram of the receiver to vibrate according to the variation of gurent. Thus sound is transmitted exactly as apolem into the transmitter.

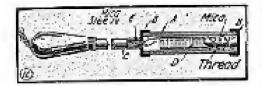
It is hoped that this short article on the photophone will interest many readers, who are interested in scientific research, as a great deal of experimental work may be performed on photophones. This apparatus may be advantageously used by Boy Scours for signaling purposes, etc.

Transcontinental telephone ralk is made possible to a large extent by the De Forest audion amplifier.

AM. ELECTRIC IMMERSION HEATER.

100

The first thing to be made for this useful form of heater is a one-inch sipe sipe ple A, 4 inches long, and two caps, B. It. In one of these caps drill a 5/16-melt hole and tap for %-inch pipe. A %-inch apple C about 3 inches long, is next intered into this cherack. Care should be taken to see



Simple Electric learners in Heuter.

that this case and nipple C is made watersight. This is facilitated by planing white lead on the threads.

The heating element is would all a K-inch postelain tube D. Now wind 20 feet of No. 24 nichtome resistance wise on it, and each turn should be separated from its neighboring men, so that they will one short-circuit each other. Lead about two feet of wire through the short nipple C. Splice on to these leads some lamp cord, or better yet, use asbestos insulated beater cord. Make the aplice by twisting the wires together and insulate them with the wires together and insulate them with a winding of arbestos string. Try 110 volts across these leads. The element should heat up to a dull red, it not use less turns of wire. Ge; some thin sheets of mice and wrap them around the element covering all exposed wire. The the mice on with some thread. This will held it until placed in the case, when the thread will burn off, leaving the element insulated from the nipple by the man. A mica sleeve E is next made and inserted in the nipple C. It is used to insulate the lead of the nipple control in the nipple control in the nipple control in the nipple control in the lead of will burn off, leaving the element insulated It is used to insulate the lead wires from the case. Turn up a sitort wooden handle of any desired shape and drill a hole through it. Lead the lamp cord through this hole and force the handle into the nipple. Test carefully to see that these are no grounds to the case. An attachment plug on the cord completes the heater. Be careful in using it, that it is always immerged, while the current is on, else it will soon burn out. The drawing shows the arrangements of the various parts.

INVISIBLE INK RECIPES.

I am sending you sense formalic for invisible ink, for which I think the experi-menter may find much use on various oc-CRESCORS.

Recipe No. 1,-Writing fluid: 1 deschot potassium indide; enough water to make I ounce. Reagent: A strong solution of bichloride of mercury; apply with a brush

and the writing will come out red.

Recipe No. 2.—Writing fluid: 1 draches potassium ferracyanide; enough water to make I ounce. Reagent: I drachm per-chloride; enough water to make I ounce, or 50 per cent, solution of sincture of iron; apply with a brush and the writing will

come out thue.

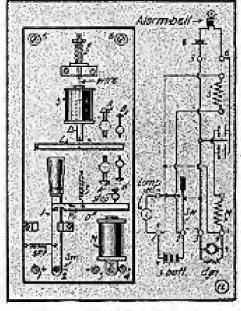
Recipe No. 3.—Writing fluid: I drachm cobalt chloride; enough water to make I onnoe. Reagent: Heat, and the writing

will be blue. A small premain of aracia gum added to the writing fluids will improve the writing quality. I prefer the number one because it is easier to get, the paper is unstained and the writing can be crased by simply heating. I will be pleased to hear from any one who tries these formula. Contributed by K. K. KNAELL.

AUTOMATIC BATTERY CHARG-ING BOARD

The following is a description and illustration of a simple switchboard designed to call the operator's aftend on when the storage cells are bully charged or need charg-When the cribs are charged to carpacies the combined switch are circuit breaker shown on the lower half of the board cuts out the charging circuit, also rings a belt of similar starm. When cells are discharged to a point consistent with safety the alarm again rings, indicating that the cells need charging.

Referring to the drawing. S is a solenoid wound with buy wire to a resistance of 120 obust for a six-well disarging circuit. With higher voltages the olimage of the spheroid must be increased propagations ately. P is a soft from plunger loosely suspended in the softenid. At F is a spring and nut for adjusting the plunger. which moves freely in the solution. It is a brass bar, pivoted and connected in plunger P. A and A' are adjustable contacts, B and B' are also contacts, B and A', but smaller, M is a hard a superfection of the branch contact. strong electro-magnet wound with large



Olever Dattery Charging Panel.

wire (No. 13 or No. 16) to resistance of the ohms. D is an iron armatuse lever shaped as shown, pivoted at PV, its end bring a sort of trigger, engaging a pin at-tached to switch SW. SP is a cather strong spring to pull out switch blade, when released at J, over to switch contact

on left.

The plunger P is made such a length as to ester less than half way into the brass solenoid tube. The plunger is drawn intothe core in proportion to the rise in voltage, and released when the voltage deorganes or falls. It is, in principle, a volt-

Referring to wising diagram, positive generator lead is connected to bereinal 4; negative lead connects to 3. Positive storage-battery lead is enumerical to binding post I and the negative lead connects to bluding post 2. Posts 5 and 6 minutes to bell or other alasin in series with dry cell-

When wiring is finished and dynamo and storage cells connected to their binding posts, see that switch is in vertical position shown in sketch.

Comparance charging until cells are fully charged. When this occurs, adjust contact A until it touches I. Do the same with B. This done, the magnet M attracts D, releasing switch, which is pulled to leftchand.

switch point by spring SP. Alarm will ring also. E is a small spring to hold the armature lever in horizontal position,

July, 1915.

Now discharge battery to a point consistent with safety (about 1.78 volts per cell). Then adjust contacts A' and B' until bell rings. The bound is now ready for steady work, requiring no attention other than throwing switch to right-hand switch point when charging.

If the dynamic is driven by an electric motor which is in series with a circuit breaker, by connecting the circuit-breaker magnet in series with the circuit-breaker nugget of the switchboard the dynamo will stop automatically when colls are fully charged.

The switch parts, binding posts, contacts, also the solenoid and magnes, which are wound to order, can be supplied by any electrical house if you don't want to wake them. Contributed by CLARENCE W. GALLINGER.

STRONG MAGNETIC FIELDS.

An electro magnet constructed by Denlandres and Peret and described in a com-munication to the French Physical Society last year produced a magnetic field of 41,-000 gausses in an air gap \$1 millimeters long and 3 millimeters in diameter, with pole pieces of iron. The exciting current was 24 amperes in this case. The maximum field obtained was \$1,500 gausses, unlizing \$3,800 ampere turns.

With special pole pieces of cobalt steel a field of 50,500 gausses was produced in an air gap 1.7 millimeters long and 3 millimeters in diameter.

U. S. SIGNAL CORPS BUZZER TELEGRAPII.

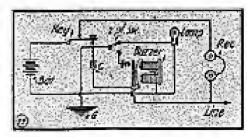
The relegraph signaling system employed in the United States Signal Corps branch of the army is very ingenious and, as if generally known, will operate under very poor electrical conditions, as when the wire may be cut in one or more places, etc.

We show herewith diagram of connec-tion as used in these field type, buzzer telegraph sets, and the signals are received at either station by means of head planners. shown.

Classing the key at either instrument operates the businer, which operates a secret of rapidly interrupted electrical impulses, having several times the voltage given by the battery owing to the high self-induction

of the buzzer magnets.

This set is also arranged with a switch in some cases, so that at night the set may be unifized for flashing signals by means of a battery lamp, indicated on drawing. In this case, of course, no line wire or



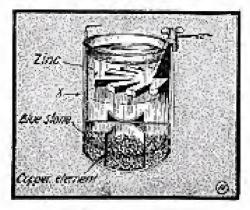
tj. S. Signal Corps Burger Telegraph.

ground connection is necessary and she sigunds are observed from at a distance by means of field glasses, etc., the short and long signals of the telegraphic code being produced by giving long and short flashes of light in the hattery lamp.

to may be contacked that a small con-dense: Is usually brooked across the burser contracts in order to reduce sparking.

HOW TO CONSTRUCT A GRAVITY BATTERY.

To set up a gravity battery use about 8 % pounds of bluestone, or enough to cover the copper element I high. Pour in water



Making a Gravity Stattery.

sufficient to cover the zinc one-half (%) inch, short circuit for three hours and the battery is ready for use. If desired for use immediately do not short circuit, but add five or six punces of "zinc sulphate."

Keep the dividing line X between the blue and white solutions about consists inch below the bottom of the size. If too low, siphon off some of the white liquid and add the same amount of water, but do not agitate or mix the two solutions.

This type of battery will give about 0.6

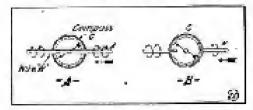
This type of battery will give about the of a volt, but only a fraction of an amount. It is used for burgler alarm and closed circuit telegraph work very extensively.

Many amateur electricians and some profussionals have undoubtedly had operatorsible trouble with gravity batteries. They follow directions carefully and then fail to get good results. The usual trouble is not with the battery itself, but with the circuit. A gravity battery is suitable only for a circuit which as normally closed. It is therefore undesirable for "electric bells," "induction coils" and all other open dresult apparatus requiring fairly strong current. The circuit should also have a high resistance. This makes it impractical for running fan maters, as the motor would have to be wound with fine wire. And it would then require a large number of batteries to give a sufficiently high voltage.

Contributed by W. JOHN GWINN.

DETERMINING DIRECTION OF AN ELECTRIC CURRENT.

If the correct in a wire is flowing from south to north and a compass is placed made the conductor, the north end of the needle will be deflected to the west, as



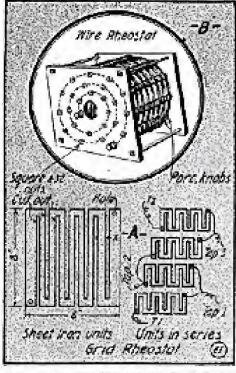
How the Compass Acts When Placed Under and Above a Live Electrical Conductor.

shown at A in sketch. If the compass is placed over the conductor, the north end of the needle will be deflected to the east, as shown at B. The compass meetle should be placed parallel with the wire first. Even the current from a dry cell passing through a comfactor to a bell, etc., will deflect the compass. This is the basic principle on which the galvanouster is built.

CONSTRUCTING RHEOSTATS.

Rhenstate or resistance boxes are often required in electrical work, and a few types are illustrated here which the practical man will find of interest. At Fig. A is shown how ordinary from sheet, or German silver sheeting, can be cut to resemble the grid resistances employed combinated by for equipolities motors, and so on.

The outsiler of sleets used and the width of the strip X, as well as its thickness and length, are, of course, dependent upon the cerrent required to be earsied, as also the voltage drap to be effected. The physical properties of sheet metal are to be found in any handbook an electricity. It is easy to figure out the resistance required for a given lead. In its equal to the volts drap required divided by the current in ampress to be used. Say, for instance, that 40 volts drap is wanted and a current of five amperes. Then the resistance of the whole rheasted must be five into 40 or eight ohms. The various grid platta can be connected in series or an parallel as devired. The total resistance of a series rhoostat will be that of



Rineastat Construction and Details of Sonic-

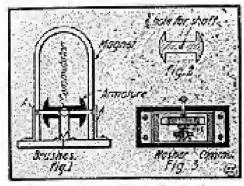
one grid multiplied by the number of grids. On parallel the total resistance will be that of one grid divided by the number of grads. The accompanient of grads in sprice is indicated.

A compact and cheap form of theostal used for are lamp ballast, etc., is the cylindrical type shown at Fig. B. Several layers of wise are used in a small spoor in this unique design. The turns are wound on small grooved percelain knobsplaced on a series of design metal rods, threaded at both ends, and secured in place furtween two stells end dies by nexagon or square 8-32 sitts. Tap leaders he hought out, of course, as desired from any layers or parts of layers to switch points.

When a storage fattery is only partially discharged it exquires only a partial charges. Charging a battery that is already full is not only a waste of current, but it is injuritous to the battery, and care should be taken to cut off the current as soon as the maximum charge is attained.

HOW TO MAKE A SMALL ELEC-TRIC MOTOR.

A small electric motor can be readily made from odd parts by any experimenter. The magnetic field is supplied by a permanent magnet of the horse shoe type, as perceived. The annature consists of eight or



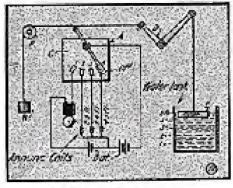
Electric Motor Which is Easily Made.

10 pieces of soft iron, cut as shown in Fig. 2, and made from No. 27 soft sheet from, or the will do. The armature sheets are kept in place on the sheet by two nots which are tightened up family on either side or they may be soldered in place. The bearings are made of heavy sheet brass with a 3/16-inch hole on each end and one in the center, to take the shaft. Next arrange bearing support A A, of brass.

The stand consists of four, or better, one piece of brass, screwed to the base on rach side of the magnet. A 3/16-inch shaft threaded at the center carries the cammatator and armature. The commutator is made from a wooden cylinder ½ inch in diameter and ½ inch long, and it is second on the shaft by forced fit. The wooden cylinder is now covered with some heavy tin foil, which must be securely glued on and afterwards cut into two pieces, to make the two segments as shown in Fig. 3. Now wind the armature core with seven or eight layers of No. 3½ insulated magnet wire and carefully faster the ends to the two openingter segments by small nails or serews. Two short pieces of sheet brass for bruslers are next tent, as shown in Fig. 1, and are secured to the base by means of two brass serews. These strips act as brushes and should touch the commission were lightly, but at the same time making good contact with the commutator.

A WATER-LEVEL SAFETY ALARM.

A very simple water-level safety alarm can be readily rigged up by following the instructions and drawing given berewith.



Simple Water-Level Alurm,

At first construct a trip switch A shown in drawing, which consists of brass contacts 1, 2, 3, 4, and a lever B mounted on a suitable lase C. Next construct the lever arm A with its float E. After these parts are completed mount them on a wooden (Continued on page 102.)

WRINKLES - RECIPES - FORMULAS

Edited by S. GERNSBACK

Under this heading we will publish every month wested information in Mechanics. Exercisity and Chertistry. We shall be pleased, of course, to have our renders and to any reciper, bearmade, writhles, mere ideas, etc. useful to the experimenter, which will be duly paid for, upon publication, if acceptable.

FORMULA No. 11. Photographic Baths.

(developers).

Ethonogen Menlopera.—No. 1. 20 or. Diptided Water, 2 or. of Sulphin of Sada (cryst.). In or. of Ethonogen Crystal. No. 2. 20 or. Distilled Water, 14 or. Curbonate of Potosh. Mix No. 1 and 2 in equal parts, and to each coare add 2 to 4 drope 10 per cent. solution Bromide of Sodium.

ent. sommon promise of Somm.

Hydrichinon Developer.—No. 1. 10 oz. of Digisted Water, 2 oz. of Southins in cryst. chem. pane, 1 oz of Hydrochinon. Dissolve and keep in a yellow bottle. No. 2. 10 oz. of Distilled Water, 2 oz. of Carbonate of Polask, 1 oz. of Carbonate of Soza. Mix 2 dem. of No. 1 and 1½ dem. of No. 2, then add 3 oz. of Water (dist.).

Combined Hydrockinon and historogen Developers.—No. 1. We parts of Sulphile of rada (cryst.), 40 parts of Crystal Scan. 1.000 parts of Distilled Water. After solution filler. No. 2. 50 parts of Eisonagen, 50 parts of Hydrochinon. Place logether in a mostar, gried down to fine powder and keep dry in well stoppered glass bottle. For use take one part of No. 2 and distolve it in 100 parts of No. 1. This developer is one of the best known; it processes all the galvantages of the other developers, without their disadvantages.

tron Developer.—No. 1. 120 gr. of Citric Acid, 83 gr. of Carbonate of Ammonia, 1 cz. of District Water. No. 2. 140 gr. of Sulphane of Iron, 1 drop of Sulphane Acid, 1 cz. of District Water. To 3 parts of No. 1 and 1 part of No. 2.

Ferrous Citro Oxolote Developer.—No. 2. 1 oz. of Neutral Oxolote of Potash, 2½ oz. of Bromide of Potashim, 5 oz. of Hot Digilled Water. No. 2. 2 frm, of pure Proto-Sulphote of Iron, 2 oz. of hor Dissilled Water. Mix together 2 parts of No. 1 and 1 part of No. 2.

Pyro Developer.—Dissolve and keep in tight fitting suppored battles. No. 1, 50 gm. of Pyrogalite Acid, 150 gm. of Sodium Sniphite, 10 ge, of Litric Acid, 1 or. of Distilled Water. No. 2, 50 gm of Petersium Bramide, 1 cz. of Water. No. 3, 2 dem, of Ammonia (0.880), 2% vz. of Distilled Water. Take 1 peri of each and mix.

Thuypex Developer.—1 or, of Distilled Water, 14 gev. of Sulphate Fron, 10 gr. of Sulphaer, 3) win, of Acetic Acid, 2 mm. of Nitric Acid.

NEW INVENTIONS IN PHOTO-PLAYS.

(Continued from page 80.)

for many years, which rossists of making the suspected that or criminal hold some rire in his mouth. The suspected persons are lined up in court and scattere procuraced; afterwards the time from each one of their mouths is removed and examined by experts. The one from whose mouth the rice shows no moisture is invariably the guilty one; as it is claimed that although their faces may not shore our change of contion when they are guilty there is an inward muscular and nerve action taking place which causes the saliva to be encoded and thus the mouth remains dry.

AN ELECTRIC TICKLER

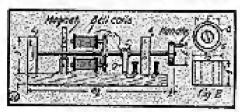
A very simple but amusing little fiachine can be made by anyone who is familiar with the handling of common tools. The following material will be necessary in order to construct this little alternating content dynamo. Two electromagnets, taken from an old electric bell; a 6-inch horseshoe steel magnet; two brass standards, A.A. 3a basis is meh; if inches of th-fieth round brass rod; is inch of 15-inch diameter round rubber rod; also a wooden base \$basks1 inch, two binding posts and brass wood screws.

At first mount the steel magnet in an upright position by means of a brass strip as shown. Next construct the armatuse, which consists of two electro-magnets mounted on 44 inch brass shaft. Upon this shaft mount a collector ring C, which is made from hard-rabber rod, shown in Fig. 2. A brass cylinder (a) is then put on the rabber rod.

on the rubber rod.

The shaft is supported by means of two breas standards as shown. One terminal of the electro-magnets is soldered to the shaft, while the other terminal is soldered to the ring C. A brats spring D is next placed on the base so that it will touch the ring C as shown. A small handle and disc are next made and placed upon the shaft.

Connections are made from one standard and from the brass spring D to the two binding pasts. By turning the crank handle and holding from conductors, which are



Two Rotation Magnet Colls Mater this filectrical Ticklet of Shucker.

connected to standard and spring, a shock is obtained. By turning the electro-magnets faster or slower the strength of the shock is varied in proportion. This is the principle of large dynamos, and the first electro-medical machines made by Kidder and others were similarly designed. A couple of the handles about %x4 inches serve very well.

OUR NEXT NUMBER

Will have as a special supplement a farte picture of

MARCONL

suitable for Traceling. This will make an ideal persons for your den or himbe.

There will also be many new features in the August issue. Be sure to order your regignor.

A WATER-LEVEL ALARM. (Continued from foge 101.)

base. The pelley P is placed on left-hand side of the base as shown. An electric amuniciator is connected to three of the phigs of the switch A, and the last contact is made with a hell. The connections are shown in the drawing. Now if the amount is water decreases the float will sink, and as soon as the level is below the 4-foot line the switch ares will make contact with the next contact piece and the antunciator will show its 8-4 feet drop. Next will come 2-3 feet, and then, when the float has sank below the 2-food line, the arm will come upon the last contact and the adarm hell will ring, notifying the engineer that the tank is nearly empty.

BOOK REVIEW.

"Elementary Electricity and Magnetism." By William S. Franklitt and Barry Mac-Nutt, 174 pages, 158 illustrations. Cloth, 748x5 inches. Leather back. The Macmillan Co, New York. Price, \$1.25.

This book is rather refreshing in a way, considering the method used in explaining the elements of electrical units, circuits, magnetism, etc. Fractical aspects of the action taking place in electrical and magnetic circuits are explained in a very logical way with the aid of special diagrams. It is a good book for students of all classes and really gives a thorough understanding of the electro-physical action eventuary. The heating and chemical efformula, so that anyone can understand them.

A particularly interesting section deals in an excellent and new manner with the "electric charge and the condenser." This section explains such vitally interesting things also as "spark discharge and corona." "electrical precipitation of smoke and dust," etc.

"A School Electricity." By C. J. L. Wagstaff, M.A. 250 pages and 186 illustrations. Green cloth, 9x6 inches. G. P. Putnam's Sons. New York. Price, \$1.50. Mr. Wagstaff has presented his treat-

Ms. Wagstaff has presented his treatment of electricity and magnetism in a rather new way, so to speak. The magnetic field of force is thoroughly covered and some new curves and figures of the magnetic flux field around different magnetic and circuits are presented. This is a good book for the student and will endoubtedly give him a very keen perception of the laws of magnetism and electric currents.

Each chapter has a number of questions at the end of same, and unmerous practical experiments are described. All teachers of electrical subjects would do well to look over this work. About a dozen fine playes appear at the end, showing clearly how the magnetic flux appears in the field of various magnetic poles.

"The Boy Electrician." By Alfred Powell Morgan. 394 pages. 324 illustrations. Cloth. 8vo. Prite, \$2,00. The Lothrop. Lee & Shepard Co., Hoston, Mass.

A new and extremely practical book for the boy and young man is this latest work of nearly 400 pages from the pen of Mr. Morgan. Every kind of intrument imaginable is described in attractive style, with excellent working drawings to guide the builder of same. A good feature is that which incorporates half-tone or photographic views of the various completed apparatus so that the reader will be sure to understand just how each instrument locks when finished. Wireless apparatus as well as high-frequency wills for demonstration, etc., are clearly described.

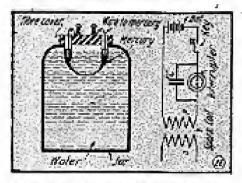
BIRD CROSSES WIRES.

Recently mention was made of a cross on a line in California caused by a sonder, says Tripproph and Tripphons Age. Now J. L. Henritzy, superintendent of tripproph of the Calorado & Southern Railway, Denver. Col. writes that one of his lineman cleared a cross by remeying a Chinese phensont, whose neck was in the twist of two wires. As the bird had not been dead over an hour, it made a toothanne meaself for the table, busides supplying beautiful long tail planes.

UNIQUE SPARK COIL INTER-RUPTER.

July, 1915.

Here is a description of a really practiml interrupter which gives perfect satisfaction on coils up to Joinch que's. With



Unique Mercury Interrupter for Small Colle.

this interrupter sticking contacts, etc., and Enkelowyn,

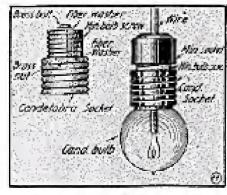
To construct the apparetus, seeme a two-cent "Mason" fruit for and our from fiber a sover to his. Bend and draw out a glass tube at shows, making the hole in the middle of the level almost as small as that in a thesistemeter tube. Bore two holes through the fiber cover and St the arms of the glass tube tightly into them. Mount two binding posts on the fiber top and contact that pieces of No. 14 copper wire to them as shown.

To operate, fill the jar with water to the level shown, and the heat glass take with mercury to about the same level. Experithe rule must be filled. Now connect the interrupter in series with the North-rul primary, key and battery, having previously removed the hausmen interrupter or builged it across with wire. As soon as the current is switched on a bright green spark will appear in the tabe.

The water in the jar serves to carry off the heat generated. The interruptions are of a higher frequency than those chlained with a will rater and are steadler. This in-terrupter was invented by Mr. II. Gerns-lack in 1896. Contributed by JAMES L. GREEN.

MAKING CANDELABRA BASE LAMPS FIT MINIATURE SOCKETS.

Secure an old burned-out minimuse built; break the class and scrape the plaster of paris out. Take the fiber washer out



iffere de Uso Condelabra Rese Lamps in Missis-gare Società.

and you it on the other side; then put the bolt through. Then place the candelabra socket on and jut a fiber washer in it. Citing the unit and screw up tight. It

when screwed in a miniature base it re-fuses to work, melt a drop of solder and put it on the head of the bolt, but be sure the bolt is we'll insulated from the brase socket. Then serow it on a miniature socket and put in your candelabra bulb. Contributed by ALBERT PETTY.

BEDSPRING AERIALS,

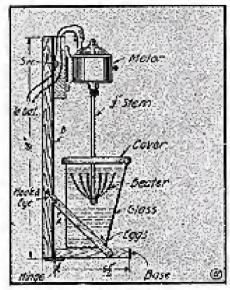
I find that when using small radio re-ceiving sets that they work better by using a steel woven wire much bedraying for an a steet waven whe much become as a actial than an indoor aerial consisting of five strands of copper wire, I foot apart, having a total length of about 60 feet, Contributed by E. J. BACHMANN.

The trans-Atlantic wireless stations in Germany have been heard clearly at the University of North Dakota sadio station, a distance of 4,300 miles.

ELECTRIC EGG BEATER.

Secure a base 6% inches long and bings it onto an 18-inch upright piece as shown. Fasten a Mock 2 inches thick at top and to this fasten an electric motor. Proten on the shaft a M-litch beass stem and then solder some light strips of tin to the end and bend as shown.

The have has a longe so it can be low-



figg Boster Deiven by Small Motor.

ored to put glass of eggs on. A is a brace which can be booked onto B. The motor may be arranged to able up, so as to remove beater head from eggs or phosphate. container without hinging upright. Con-tributed by CLARENCE LINDGREN.

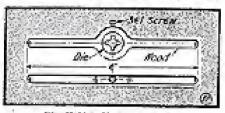
A TIN-FOIL ADDRESIVE FOR CONDENSERS.

A very good way to seeme tinfol to condenser plates, and one which will be easie blistering, which is so disastrons to condensers, is as follows: Place the plates to be coated so a moderately when oven and hear them for about 5 minutes. Then remove them and rab the surface with becawar. Place the finfoil over the wax and smooth down. It is advisable to place and the of then expect ribbon on the plate under the distoil before the distoil before the distoil is put on. The corates should be gainted with begswax after the tinfelt has been placed on the plaza. It is best to round the cur-ners of the titefull sheet. Recovers is far superior to shellow for this purpose.

Contributed by WALTER FRANSEEN.

WOODEN DIE HOLDER.

I are sending you a drawing of a home-made wooden die holder which I used be-rause. I did not have the right-shed bolder for a small die. Bore hole half way through the wood handle as shown, so that die will fit very snugly. Bore a small hole for the thresded and to go through. Put



Die Bolder Made of Wood.

die in larger hole and thread a strew in the notch on the edge of the die as moral. Indier will do real serviceable work.

Submitted by

NELSON RULLAND.

HOW TO MAKE SOLDERLESS CONNECTIONS.

Perhaps some readers find trouble in making a good wire connection when solder is unavailable. I think they will find the following very efficient, especially with alumineer wire.

with aluminees wire.

First, scrape about eight inches of the wire to be consected. Be sure all correction, dirt, or grease is scraped off therecigoly. Then twist the wires together very tightly. A piece of tinfoil about as inch wide is lapped over the connection twist. The tinfoil should be lapped as tightly as possible without terring, then persect together with the fingers. After this lap one or two layers of tang ever the this lap one or two layers of tape over the finfoll, to no correction or rain can get to the tinfoil. The tage is pulled very right, so as to insuce a good connection between the tinfoil and the wire. It is well to paint

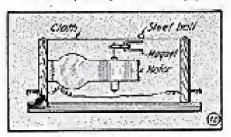
it with asphaltum.
It should be understood that this little scheme should only be used when solder in not handy.

Contributed by

D. K. WALKER.

A MAGNETIC WINDOW AT-TRACTOR.

Make a small box fixing inches. inches from one end put a block 8x2 inches. Upon this place a small motor so that the arrantare does not project over the top. To the armature faster a small stick with a horseshoe magnet attached to one end of it. Put a very thin piece of cloth over the



Store Window Novelty Basily Mede-

top as the Inside of the box does not slungs. Arrange it so that the magnet nearly touches the close. On top put a steel ball bearing. To each end attack a binding post the ball will follow the new tating magnet. A glass mirror too on the box is been, but requires a stronger magnet that, when cloth is used. Contributed by EARL PRATT.

ELECTRICITY, THE POWER BE

THE submarines have proven even thus far in the great European war, that they are indeed of extremely valuable service and that even though they are much cheaper to construct than the wonderful "dreadnoughts" costing ten to twelve million dollars apiece, they can on the surface of the water they invariably make use, of course, of gasoline or later-nal combustion engines, using crude oil such

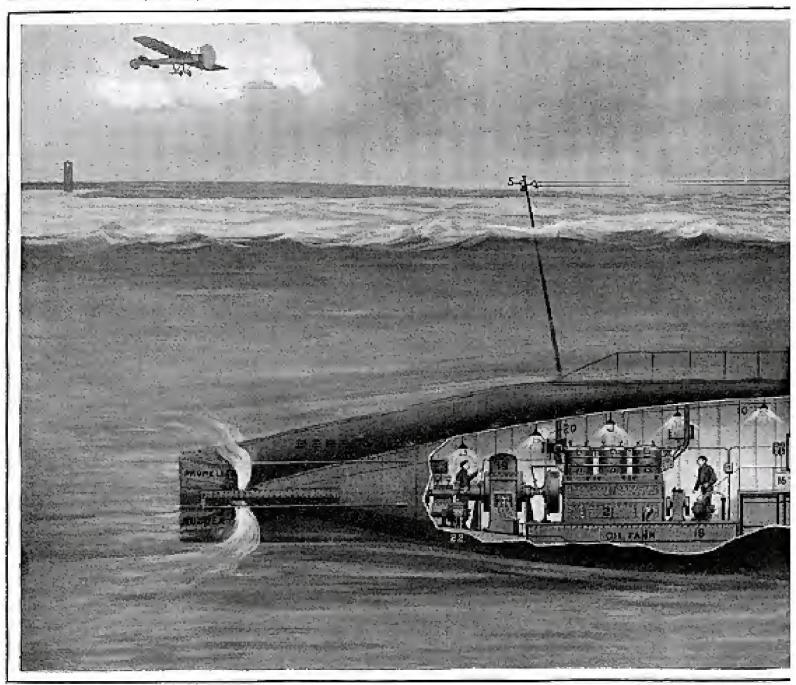
as the Diesel type.

For this kind of cruising some of the latest United States submarines make use of a 900-h.p. Diesel oil engine, which

trom Florida without incident, under their own power. Thus, it is seen that Uncle Sam's underwater boots are on par with those of the German and other navies.

At present there are about 35 submersibles in actual commission, and the total

bles in actual commission, and the total number, including those being built and



KEY TO

- Perintege for viewing the enemy front be-low the water line, as pecceived.
 Electric search light for see on surface, when cruising.
 Centralized control standard for surface.
- crutalog.

- Principle Antenne.
 Electric sepasi and running lamps.
 Perfecting view finder.
 Perfection view finder.
 Contralized control standard for submaring running.
- 9. Lairai tyje garoscopie compass.
- m. Electric lights.
- it. Whyless purifichinged and apparatus.
- to Electric trigger for discharging torpodoes.

very easily and shortly, under certain con-ditions, dispatch these great lighting-ships to the bestom of the seas in a few minutes? time.

Probably more than is generally scalined, electricity is really the backbone of these wonderful underwater engines of destruction. When these submarine boats travel

makes it possible for these boats to attend a speed of 14 knots, and sufficient oil fuel is usually carried, enabling them to make

a cruise of 5,600 miles.

Several of the submarines of this type, which took pure in the recent Naval Dem-emeration and Review in New York Har-For, made à 1.500-mile pun up the cosse

those undergoing repairs, is 55, Electricity is the wonderful form of en-ergy which enables these craft to be propelled through the water submerged for distances of 100 and more mastered miles at a maximum underwater spred of from 10% to 11 knots. Powerful elevatic messors drive the propeller blades for this under-

HIND THE SUBMARINE BOAT

field Secor

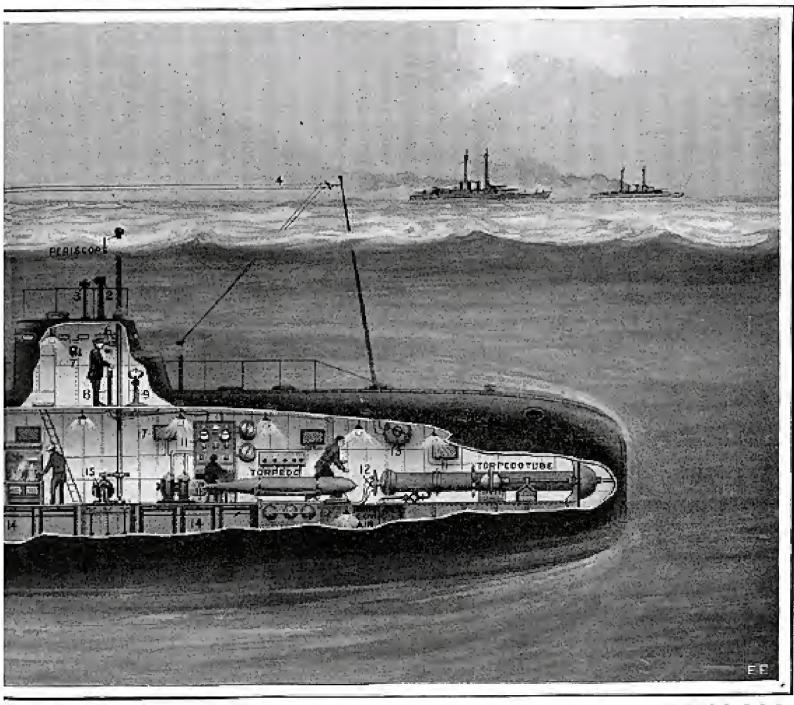
water propulsion, the motors developing 656 hp, at the above full-speed rading in knots. These motors and all of the other electrical appliances on learnt the submarine obtain their energy from storage batteries, which, of course, have to be quite large. Practically all storage batteries

including Thomas A. Edison, are and have been working for a considerable time toward perfecting a storage lattery for this class of work which would not give

forth poisonous fames, etc.

Mr. Edison's latest submarine storage battery promises to fulfil these require-

and latest type boats of this character carry a high-grade wireless see to be used with an antenna supported between two steel matty, as will be seen. It is claimed that the Germans have obtained much of their incide or secret information from spies etc., by means of wireless messages



LUSTRATION

- La Large storage battery.
- ig. lifestric motor for tilening periscopes
- 16. Electric atove for pocking crew's meals.
- Preserve heaters for warming the interfer of the aubmarket.
- Circulating pamp for engine, driven by electric motion.
 Powerful electric dynamic used for charg-ing batteries on surface, which acts on electric motor for driving the submarine when below surface.

- Photo (C) by E. P. Co.
- zi. Shilting year to threw propeller an engine
- 2). Internal combosium engine, such as Diesel CA DE-
- at theeric motor operating streeting gest.

used for these installations are of the usual

These basteries make use of sulpheric acid, of course, and hence they give off very poisoneus fumes, which often endanger the braith or even lives of the crew when the bost is submerged for a num-ber of lumes. Therefore several inventors,

enersis in very good shape, besides having several other features which can be turned to good account in the submarine installation, such as revitalizing the air, esc.

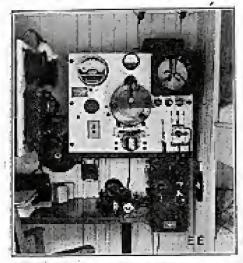
The idustration herewith given abows a number of the more important uses to which the electric current is out on board the submarine. Of course, all the larger sent out from secret or hidden wireless sentions on land in England, and which massages have been picked up by some of the German sylmacines lying off the coast a few miles. Those submarines can flow, of course, cruise away until they get within touch of some wireless communication (Communication

DEPARTMENT

New Arc Radio Set For Ships

NEW and type wireless outfit was recently developed by the DePorest Radio Telegraph N Telephone Co. for use on ships. The photograph shows the exception outfit as it is installed on the steamship Win. Chapman.

The transmitting set massists of an age of special design, shown at center of special design, shown at center of special design. This are contains two gaps in series, operated by 600



Deboving New Are Radio Ger Installed on the Steamship "Win. Chapmen." 3.1 Centrator

volts direct current, supplied by a motoracherator set.

The electrodes, P in the diagram, Fig. 1, consist at an alloy of platinum which has a very high melting point. The large discs O act as heat radiators, and the gap is also cooled by a fan below it, as shown. The gap between the electrodes is regulated by a thumberew O placed in front of the arc. Fig. 1 shows the exact construction of this are. The secondary circuit of the are con-sists of a combroser belond the switch-board, a belies mounted on the right-hand from morner of the switchboard, and wire radiation ammeter and a control switch for

rhanging from 600 meters to 300 meters wave length. An acrial throw-over switch is also majunted at the ex-The toguse right. prämäry discust än-chides an ammeter mounted on the extriting left, of the switchboard and conpetted in series with a choke cail, egg, as the diagram tadicates.

The most interesting part of this are is in starting in When starting every age it is first necessary to class both electrodes

together and after separating them an are is then formed, but with this radio are it is only accessary to close a switch, which short-discrits the generator for a moment through a powerful clocke or impedance coil and suddenly opening the switch. As some as the switch is opened an are is formed as this contact of the switch, which is extinguished by blowing it. The are at

the special gap electrodes is immediately formed. The distance between the gaps is about one-eighth of an inch long. When in operation this are produces un-

damped escillations which cannot be reselved with the ordinary detector on ships, 20 a specially designed rotary commutator is employed for changing these undamped oscillations into ordinary spack oscillations. of lower frequency. This denies is called a "chepper" and is seen on top of the table. With this chepper the operator can send to ships and also to lond stations taying the Paulsen dikker receiving quality just by custing out the chooper, which is done by means of a double-code singlethrow switch next to the meter when the and's undamped waves are sent out.

The motor-generator is located in the engine room and is operated by a band control switch and an automotic solenoid switch. The panel on the extreme left of the room shows the generator board with all the necessary instruments, including ammeter, elte.

This particular outfit is rated at 2 K. W. and a maximum serial reading of 5 amperes is obtained. The arrial consists of six wires 49 feet lone. The receiving outlit consists of the lates; type Andien detector and is seen on the right.

· Simplicity is the principal feature of this well-built act, which is a new departure in American-iguale wireless apparatus,

THE MEYSTONE WIRELESS
ASSOCIATION.
The Keystone Wireless Association was

organized in February, 1916, with hix members, B. Birnsen, William Boyle, L. Clancy, H. Finker, S. Hancox and W. Raeling.

The members meet in the basement of Brother Dimson's house every Socurday night at 8 o'clock to practise the code and qualify for a becase, or snything else that they wish to do. We have a small library with wireless books such as The Electrical

Experimenter.
We would like to have any young men interested in wireless and between the ages of 17 and 25, inclusive, to join. Anyone desiring information will receive some by NEW ARC FOR RADIO-TELEPH-ONY.

A may system of radio-telephone was recreitly out into operating condition by a Brooklyn inventor. Short distances up to five suites have been covered very successfully with this new system, which employs.

a special arc.

The delephone transmitter escillation generator consists of a specially designed are with a gas chamber that receives illuminating gas, and also ammonia gas under high pressure is sent through a small co-



Inventor Using His Improved Type Radio-

axial hole in the metallic anode. This gas is used to maintain the oscillations steadily and at the same time to cool the are, thereby eliminating the use of water for cooling the anode. A variable espacity and an inductance is shunted across the arc in such a manner that a continuous Sceam of oscillations is produced. The frequency of these oscillations was constrolled by means of the variable capacity of the air dielectric type. The are was operated on 11,000 volts A. C. and continuous escillations with a constant amplitude. are readily produced,
The variation of sound is produced by a

specially designed water-cooled transmitter.

Under operating con-ditions the transmitter has stood continu-ously three amperes without any sign of beating whatever. The receiving set was the Ordinary crystal type with an injustance and a variable capachas found that a combination of galena and sincise gave the clearest gound in the receiving set.

Dr. Alfred M. Goldsmith, of the College of the City of New York, pre-

teresting and instructive paper on "Poreign Radio Apparatus." The paper coresting. was plentially illustrated by lantern slides. The Telefunken, Goldschmidt, Lorenz and Paulsen, Berliner-Poulsen and Compaignie Générale Radiotalégraphique systems' apparatus were shown by lantern slides and later discussed by R. H. Marriott. B.S.; Dr. Zengeck, Dr. Wheeler and others.

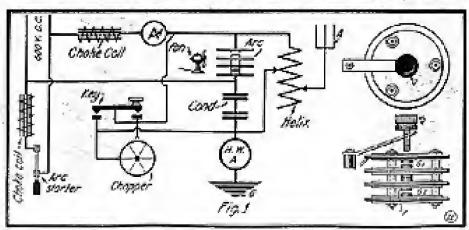


Fig. 1. Blactam of the New BeForest And Type Wireless Transmitted.

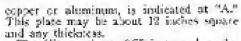
writing of calling on S. Hancox. 085 Lexington avenue, Brocklyn, N. CERTIFICA

RADIO CLUB OF AMERICA MEETING.
The last meeting of the Radio Club of America before the america holidays was held May 20 in Fayerweather Hall, Columhis University.

A Wireless Lecture Set

I's simple, yet effective, wineless lecture or demonstration set is always in great demand, and herewith is illustrated and described a satisfactory outfit of this type which can be built for a reasonable sum. The apparatus comprises a filings co-

Fig. 8. This litustration Shaws a Neat and Effective Way at Mounting a Goherer Style Wireless Demonstration Set on Oak Switchboard.



The filings coherer "C" is tapped or decohered by the vibrating bell mechanism "D," Not more than one sky cell at "II]" should be connected

The Set Here Depicted Employs Two Relays and This Has Been Found Rest for Coloner Sets. Where Other Apparatus Than De - Cohere Art to be Constituted.

in a result with cellay "RI" and the coherer.
It has been found best for such sets to use a sected celay "R2" with which to control carriers desironstrutive apparatus, such as electric whistle, in mps. They meeters, etc. These devices will be ob-served on the panel in Fig. 1, and the motor has a piece of angual fastened to the shaft so that its movement will be quickly and easily discerned. It is also a very good idea to as a p'k some white bands on the strip of metal sastened to the motor shaft, so that its movement will be more quickly noticed.

The relays for this set are simply those known as "pony" tele-graph type, etc., and while for short distances up to 50 to 75 fort it is not ancessary to use any ground checking "G" (corresponding in size to the metal plate "A" previously mentioned).

this capacity should be used as shown in dotted line at Fig. 2 for greater distances than (bose mentioned. For distances above 150 to 200 feet it is best to use 19-10-foot beass tubes, etc., or a small aerial stade of copper wire, etc., with a metal plate several feet square for the ground capacity or municipoise. These sets, of course, should be operated, whenever possible, without

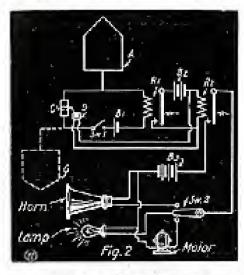


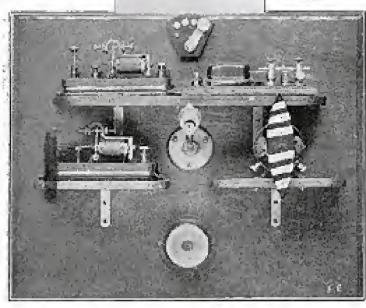
Fig. 2. Diagram of Coherer Set Connections.

any ground connection, as audiences in general are very skeptical on these matters, and if they find or see a direct ground unmarchine they immediately believe that the apparatus is a fake.

A blanch spack cell or over very good for the transmitter, and this is usually mounted on a 5 or 6-root pele with botteries, so as to be extriced through the audience, almoing anyone to press the push-button actualing the soil. A ball spack gap should always be used for these lecture sets. For an aerial a 3-foot brass tube may project above the coil and connect to one side of the spack gap. Two such tubes at right angles act well as "aerial" and "ground," connecting each to alternate sides of the spack gap.

veloped by a well-known American wiscoless company and it is extensively used in the United States navy and army. The

of the regular telephone receivers, and a battery is connected in series with the pair of phones and the microphones as shown,



lienes, a decoherer, two relays of about 55 to 100 oldes resistance or even less (but preferably of a much higher resistance than this), together with controlling switches, batteries and the electrical devices to be controlled by the relays.

Fig. I shows a photograph of such a set, which works very nicely indeed. This is a good way in which to mount the various apparatus so as to be clearly seen by the audience: a couple of small shelves serve to support the instruments, as will be observed.

Referring to the diagram of connections for this outils at Fig. 2, the general operation and arrangement of the set will be more clearly understood. A metal plate, which also shows in Fig. 1, and made of

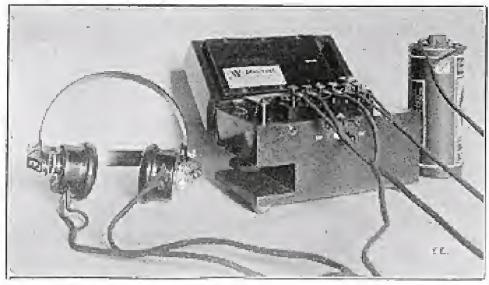
WIRELESS FROM NEW YORK TO BELMAR

Randolph Miller, Edward Taylor and Franks E. Hoyer, all of Ashury Park, were appointed recently by Justice Kalisch, of the Supreme Court, As condemnation consistency to its the price of itself whited in Echaer, N. L. By the Marconi Telegraph Cable Co. Justice Marconi Telegraph Cable Co. Justice Marconi Telegraph Cable Co. Justice Marconi Telegraph

Applications for the gosimissicates was made by John L. Grigg, president of the Marconi Co. The company's main station is at New Brunswick, and the justice was told that it was desired to establish wireless paramunication between Belmar and New York.

A MICROPHONIC RADIO-AM-PLIFONE.

A new wireless amplifone for the amplification of received radio signals is hereselch illustrated. This instrument was de-



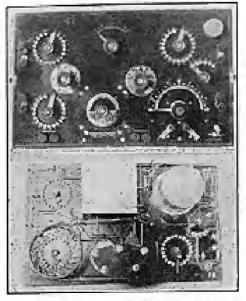
Standard Nany Type Ampiliona Employing Ealer Sensitive Microphiana.

principle upon which this amplifune works is that of the microphonic contact. There are within the box several microphones of special design and each one is connected in series with the next. The instrument is connected to the radio receiving set in place

Each microphone amplifies the incoming signal with a different amplification strength with the last microphone stage amplifies it very considerably. By using more microphones the stronger the received signals will be amplified.

NEW U. S. NAVY RADIO RECEIV. ING SET.

Dr. Louis Cohen, of the Bureau of Standards, has recently perioded a new radio receiving set which has been adopted by the United States Navy as its standard acceiving set. It is illustrated in Fig. 1,



(Abover) Fig. 1. Shows Front View of U. S. Naby Radio Receptor, (Below) Fig. 2. Roaf View of Same.

The tear view is shown in Fig. 2. The connection of each individual instrument is represented in diagram Fig. 3, where A, Co. Let constitute the primary or antenna circuit and Co. La constitute the secondary circuit. The two circuits are electrically, linked together through two small condensers Co, Co, and any degree of coupling may be obtained by varying these combine-ers. This method of coupling offers several advantages. They are: (1) Compactness; (2) increased efficiency; (3) higher selectivity; (4) simplicity in operation. In organd to the first point it is quite obvious that by eliminating the receiving transformer, or loose complet, a considerable economy in space may be arromptished, which makes it possible to build a receiving set of comparatively small dimensions. for a large range in wave lengths. The second and think points have been definitely settled by a large number of comperative tests with other receivers of the best known types on the market,

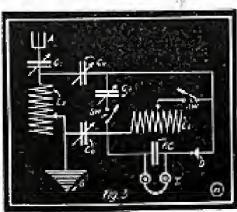


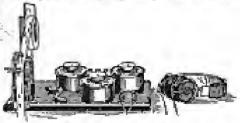
Fig. 3. Diagram of Br. Cohen's improved Navy. Type Receiving Set.

The instruments are mounted on a hard rubber board and are connected by stransled copper wires. Note that all the wires are placed as nearly at right angles as possible. This was done in order to prevent cross

A NEW WIRELESS CODE TEACHER.

An improved form of automatic wireless code teaching machine, known as the Raydeograph, has been perfected, which does not use buzzers or vibrators. The device is here illustrated and appears of great value in all-account teaching where students have no access to schools, etc. It is also used in schools.

It quite often happens, in wireless, that an operator is compelled to copy one sta-tion through the "lamming" or signals of a second station, in which case two signals are heard in the telephones at the same time. After considerable practise an op-erator can concentrate his mind on one signal and disregard the other. These signal and disregard the other. These perographic conditions are produced by the double tapes provided with the Raydongraph to perfection, with the additional advantage that the intensity of the individual signals can be varied at will. The student may manipulate the controls so that the "jamming" rignal is much weaker than the one he is copying, but as he becomes more proficient in the art of copying through in-terference he may increase the intensity of the "jamming" signal or decrease that of the one he is copying. Now, by copying first one series of characters through the "jamming" of the other series, then sice cerea, it will be seen that each tape contains from code lessons. Another novel and decidedly practical Raydeograph fra-ture is the Static Producer. It should first be explained that "static" or "x's" are take signals or an etherial disturbance caused by the effect of atmospheric electrical dis-charges (lightning). These "x's" are some-times quite severe, especially in the tropics.



Improved Fore: of Radio Code Textber.

and it is often accessory for an operator to copy a station or signals through this interference. The Static Froducer causes disturbances in the telephones identical with these X's, and by manipulating the rear left Raydoograph central the intensity of this interference is varied.

While in use at the Amherst Branch of the Nova Scotia Technical Schools this instrument has operated successfully with 27 telephones in circuit. The machine is contained on a base 8x13 inches and may be mounted on a small table or desk.

The D. L. & W. R. R. recently conducted successful wireless telephone tests between a moving train and station set, over a range of 63 miles, in mountainous country. Regular business made up the messages.

induction, which may occur. Any ware length from 150 meters to 4,000 meters can be obtained quickly with this receiving set.

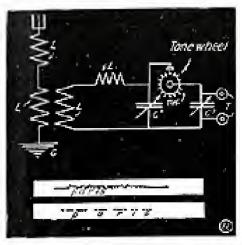
be obtained quickly with this receiving set.

Dr. Louis Conen has done a considerable amount of work in tabulating formulae for the determination mathematically of induction and capacity values, and his latest croduct in the form of an efficient ratio set will sudoubtedly be very extensively applied.

All of the coils and other parts, such as condensers, are calibrated in their correct electrical values, and the finish and work-quantitip are of the very highest standard.

THE GOLDSCHMIDT TONE WHEEL DETECTOR.

Ope of the eleverest and also simplest sadio detectors, if so we may call it, traed for the reception of andaraped wireless waves is that known as the "Goldschmids Tone Wheel." We show illustrations herewith (see Fig. 1) of this inguious device, which consists of a metal disc with a large number of teeth cut in its outer periphery



(Abever) Fig. 2. Circuite Used With "Yone Wassel."
(fielew:) Fig. 2. Tape Records et Radio Signals, and a fanely adjustable brush making contact with the edge of the rapidly rotating disc.

The operation of this device is as follows: A special motor drives the toothed disc at such a spend that, considering the number of teeth and the revolutions persecond, the number of breaks in the circuit per second will be slightly lower or higher than the frequency in cycles for second of the incoming otherse wave.

Suppose, for instance, that the contents to be received have a frequency of 40,000 cycles per second. Then, if each tooth of the toge wheel has a width of I millimeter, there will be a synchronous rotation for a circumferential velocity of 40,000 times I millimeter or 40 meter-seconds.

Owing to the difficulties of producing a constantly synchronous rotation it has been arranged for the wheel to rotate at a dightly different value than the frequency of the incoming wave. As an example, a frequency of 39,000 or 41,000 could be used for a wave frequency of 40,000 cycles.

Then the frequency of the "cote" heard

Then the frequency of the "note" heard in the telephone received in the circuit, shown at Fig. 2, would be what we might

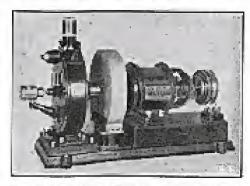


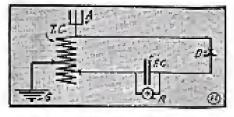
Fig. J. The "Tone Wheel" is Driven by an Electric Moter at High Speed.

term for convenience the "beat" frequency, or the difference between, for instance, 40,000 and 39,000, or 1,000. Thus a perfectly audible tone is produced from a radiofrequency current which, of course, is far above audibility.

(Continued on page 109.)

VACATION WIRELESS CEIVING SET.

No doubt many of the wireless experimenters are about to go to the country on their variations and they need not part with their instruments, as quite a compact re-ceiving set can be readily made suitable for exceying about the same as a gamera.



Circuit Hee Vicestion Radio Sec.

The case in which the instruments are placed is an ordinary hand valist, that can be obtained for about 50 cents, or a box of similar size. The instruments which comprise this set are an ordinary single slide naming coil TC,

a silicon detector D, fixed condenser PC. and a pair of 'phones R_r of 2,000 phons resistance, preferably. The moing coil is fastened to the case by sneams of these screws, as shown. The detector and entidenser are also fastened in the same manner. After the instruments are arranged connect them as in diagram.

The aerial or anseama should next be considered. There are several methods of executing an aerial. for temporary operations. One of these consists of flying a kite and attaching the actial, in the form of this copper lead. such as No. 28 or 50 B. & S. gauge, to the kite string. Trees kite string. form good support Sketch for acrials alsows a method of

supporting an aerial from a tree. Care should be taken to see that the wires do not lough any leaves or any part of the tree. The ground or easth connection can be made to any metallic body well grounded in major each, or a piece of pipe driven into the ground. If water pipes are available they should be used.

In using the set the detector in first adjusted until signals are received best, but a busier test is of course the quickest way to adjust it, and therefore it is advisable to install a buzzer test on this outfit. This set will be very assign to the experimenter. in obtaining the latest baseball and other news and correct time signals, of cotors.

THE COLDSCHMIDT TONE WHEEL DETECTOR.

(Continued from page 10%)

If a suitable high-frequency A. C galvaccometer is placed in series with the somewheel circuit very excellent tape records may be taken of the data and dashes, as Fig. 8 shows. These were registered photographically on a moving film.

RE- TALK BY WIRELESS PHONE IN BLOWING UP A TOY BOAT BY MILES.

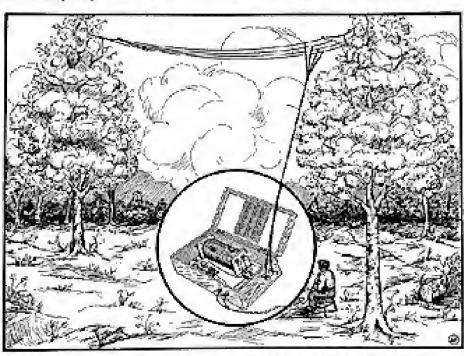
Sponsored anothicially by the Secretary of the Navy, a wireless referibute invented by H. M. Dwyer, a Son Francisco man, has reserved the human voice 731 miles. The cargied the human voice 731 miles. conversation was exchanged between the United States Government radio station at More Island and the Government station at Tatoush, Cape Flattery, on the coust of Washington.

During the test Mr. Dwigt's voice was also heard at Bremeston, a distance of 500 miles; at Point Asguello, at Eureko and by the Government radio operator at San

Diego.

The call sent from Mare Island was received on wireless telegraph sets, and the replies were telegraphed back. Through replies were telegraphed back. Through the perfection of certain parts of the new invention Dwyce says that it is possible to telephone in any kind of weather.

Mr. Dwyer asserts that he could have been heard at 1,000 miles if there had been a radio station to receive his message, and that with the proper acrial, 500 to 600 feet



How Acrisi May Sc Erected Between Two Trees for Receiving Wireless Meanages.

high, there is no season why the human voice cannot be distinctly andible from San Francisco to Henolulu.

A sound magnet unit contains the least resistance with a given core cross-secglogal area.

The upper curve in Fig. 8 shows a record produced by means of an ordinary crystal detector, and the lower record shows the remarkable clearness of the signals regartered with the tone-wheel receptor.

Although this machine has been repeatedly classed with that invented by Frad-R. A. Fessenden, known as the "Hetero-dyne," it does not operate on the same principle at all as will be evident.

This tone whool samply acts as a feequeacy changer, while the Heterodyne prodrees its results by the amplification due to superimposing a high-frequency afternoting current on the radio-circuit, and "beats" are thus produced of low fre-quency which depend upon the difference between the frequency of the etheric wave and the superimposed artificial wave. No such bents are produced in the Goldschmidt device.

WIRELESS.

Here is a new and exciting sport for boys who know a little about electricity, especially for boys who have wireless ap-paratus. It was devices by Prof. Charles orders, of Columbia University, to prove that a submarine bomb carnot be ex-ploded by wireless waves except through a appoint apparatus, says the Sunday World. With such apparatus, which is rasily made at home, you can explode bombs under boy ships floating in the bathtub or a waskbowl.

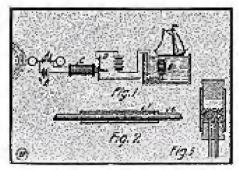
At Fig. 1 is shown a diagram of the agparatos for exploding a mine by wireless. A. coherent B. primary batteries; C. relay: D, harreness of the relay; E. vessel of auter containing minimators mine.

Anyone who has not a wireless apparatus. can make use of an induction coil or a Leyden for for producing the waves. A Branly tube organged in series with two or three day betteres well form the receiv-Eng apparatus, and this is completed with a relay from which wires sun to the fese of

The electric waves. whether and wireless. or discharged from a Legden jar, sei ngem the subgree, the battery of which aloses the relay circuit. The coheren is made of a glase tube about 11/4 inches long into each end of which a red of copper or brass is introduced. Between the ends of the rods there should be a space about is inch-long filled with filings (mine parts nickel and one part silver). Metal balls are filled to the other ends of the rods. Such a coheres offers great resistance to the passage. of the current from the lattery, but the mireless wayes greatly increase the con-ductivity of the filings, and this is emough to set the relay in action. Fig. 2 thoses details.

of the coheser; F, glass tobe; GG, copper rods, and Fig. 3 the relainture submarine

The mine is made as indicated in dia-gram Fig. & It is a metal cube about



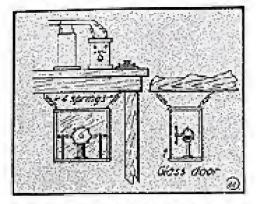
Wireless Mellard of Obswing Up Ministure Ship.

three quarters of an inch long, closed at sack end with a rather cork and the space inside loaded with ordinary ampowder. Through she lower cark the insulated wires from the relay battery are inserted, and (Continued on page 110.)

GAPS TO MOUNTING SPARK ELIMINATE NOISE.

A very many and at the same time effective method of mounting or, rather, suspending a rotary spark gap, has been made use of by a New York radio experiguender.

As the illustration shows quite clearly, the entary gap with its motor is mounted in a substantial wooden cabinet with glass



Spark Gap Noticelessly Suspended on Springs.

front and this cabinet is suspended on four strong spiral springs from the underside of the operating table.

The glass door on the cabinet should dose lightly and, owing to the method of scapension used, practically no sibration noises are transmitted beyond the wireless

BLOWING UP A TOY BOAT BY WIRELESS.

(Continued from page 199.) their ends are joined by a very line wire of from or platinum. This rests in the middle of the powder. As soon as the content passes through it becomes red hot and the powiler explicies.

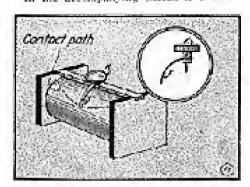
The mine is placed in the bathtub and a toy boat is sent sailing over it. At the right moment the Leyden iar is disclarged, the coherer extelles the waves of electricity, closing the main circuit; this actuates the relay, which sends the current of its hatteries into the mine. This ex-

pledes and blows up the toy boot.

Such mines can, of course, be exploded by direct current from a bonery, the circuit being completed with a telegraph key corresponding to harbor mines fired by electricity.

A ROTARY TUNING COIL SLIDER.

In the accompanying sketch is shown a



Simple Tuning Coll Slider,

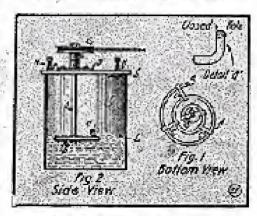
type of rotary slider that can be used advantageously on busing coils of average length and diameter. In the center of the slider her of the tuning coil bore a lade of suitable diameter to pass an 8-82 ma-chine screw. Then take a piece of 1-82x45-

CONSTRUCTION OF A MERCURY TURBINE INTERRUPTER.

The main drawback in the construction and operation of spark coils is the interrupter. The interrupter here described is of the mercury turbine type, which can be used for very large spack foils.

The first thing to be made is the spiral tabe A. Fig. 1. Tais is made of one-quaster inch brass tubing having a small internel diameter. It is then bent into a spiral as This is resultly done by placing the tube in a fire and then bending it to the required form. The ends (2) and (5), Fig. 2, are next bent as shown. The lower hend is used to suck the metcuty in, while the upper bend is used to force the mer-cury out of. A round brass disc and a shaft are next made. The disc B is made 2 inches in diameter and 14 inch thick. A M-inch shaft hole is drilled at the conten-A 14-inch brass shaft rod J is then inserted tightly in the disc. The spiral should next be placed on the dise and mechanically fastened (but not subleved) assumd as shown. Three brass strips C are secured around the spiral in order to strengthen the whole.

After these parts are completed the spiral is placed into a glass container. The spiral and shaft are supported by a brass collar D. Fig. 2, which is fastened by meens of wood screws onto the cover E. A second contact F is next made, which consists of a brass sheet I inch wide. The arginesit If can be of different widths to give out



A Mercury Turbing interrupter.

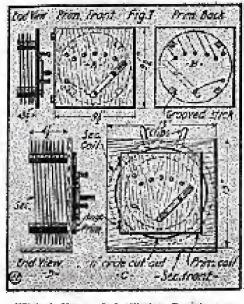
ferent results; so several of them should be made up.

The container is next filled with metallic mercury up to level L, and the made is rotated by means of a under connected to the pulley G. The spark coil is connected in series with the source of power and the mercury interrupter from binding posts H H. When this interrupter is properly built it will interrupt the primary circuit between 200 and 2,000 interruptions per minute, depending upon the speed that the spiral is revolving at. The usual primary condensor is connected across the posts H H, and is best of the adjustable type for good results, especially when different width segments are used. The mercury will combine with solder, so the spiral must be mechanically braced or else brazed with bease solder.

nch spring brass S about half the length of the tuning coil, and at one end of the spring bote a hole in order to secure it to the slider bar and length K. With a little adjustment it will be found possible to have the end of the contact spring follow the creular just on the coil as indicated. Contributed by CHARLES F. ENGLER.

A PROF. MODEL OSCILLATION TRANSFORMER.

A very efficient cecillation transformer may be made in the following manner. By a close sludy of the diagrams a good acea of its construction may be obtained.



Emstant Form of Oscillation Tradsformer.

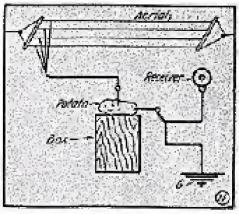
The have and other wooden paths should be made from good dry oak or other hard wood. The primary (Fig. 1) is wound with five terms of No. 6 aluminum helix wire with half-inch spacing. Each turn is specially and health with the special control of tapped and brought to a five-point switch on the front (Fig. la) so that the wave length can easily be regulated.

The secondary is wound with eight turns of No. 6 or No. 8 aluminum wire, spaced about one-half inch, and is adjusted by two elips' (see Fig. 1c).

PAUL PLEHR. Submitted by

A POTATO DETECTOR.

While purting up an aerial in my yard (80 feet long and 60 feet logh) recently 1 tried to receive wireless massages. I took a potato and placed it on a look. Then I took two sewing needles. I took one needle and stock it impoone side of the points. I then connected the second needle with one cole of the receiver and stuck it in the other and of the potato. I took the ground wire and connected it with the other end of the pole of the receiver, and when this was



A Putato Acta As Wireless Detector.

completed I was able to receive many mesanges just as clearly as from a detector. Contribused by

MILTON ROCHKIND. (An electrolytic action, no doubt.—Editor.)

THEMISTARED 11-EXPRI-GI-MOH &

This department will award the following mouthly prices: FIRST PRIZE \$1.00; SECOND PRIZE \$1.00; THIRD PRIZE, \$1.00.

The idea of this department is to accomplish new things with rid eccurates or old material, and for the most useful, practical and original line assumitted to the Editors of this department, a mouthly series of prices will be awarded. For the best ideas submitted a price of \$1.00. We will call their a \$2.00 price, and for the third best a price of \$1.00. The article need nes be very tishorare, and rough sketches are sufficient. We will make the socialized drawings.

SECOND PRIZE \$2.00.

AN IDEAL ELECTRIC RUBY LAMP.

The lighting system which I am sending herewith is one I have in use at the present those and I would never be without it.

My first experiment was with an old oil ruby lamp converted into an electric tamp,

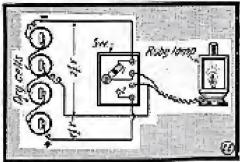


Electric Ruby Lumps For the Amsteue Philographer.

as I have illustrated in drawing. In this drawing will be seen a two-point switch, mounted on a small board having four binding posts, for making quick connec-

With the aid of this board I have used four dry cells for almost a year by simply theowing the switch from one point to the other, whenever I think of it while in the dark room, which allows two cells to cest while the other two are working. This should be a great relief to any amateur photographer, and can be used also where continuous service is required, when dry batteries only are at hand.

At present I am using a lamp which I have made of a scap box of suitable size for holding an SxIO ruby glass, in which I have two miniature lamps, and two snap switches on outside of box, one for each lamp, so that if one lamp should happen to barn out while at work I can use the other; or I can use both, if desired. The switchboard can be attached to back of lamp hos if increasery. Many an appalent dreads the work is a dark room, execcially



Wiring of Dry Batteries for Ruby Lamp.

in hot weather, with the oil lamp, which adds to his disconfort.

Contributed by VICTOR A. SCHYE.

L. John Block of Cincinnati, Ohio,

writes as follows:
"I count say the 'Electrical Experimenter' is some Magazine. The best ever in my opinion."

FIRST PRIZE \$3.00.

SIMPLE ELECTRIC DRAWER-LOCK AND TELL-TALE SIGNAL.

The following is the description of an electric lock and tell-tale signal which I constructed for use in my wookshop and have used for some time.

Looking at Fig. 1, A represents two esagnets (I used some from bells) with the yoke drilled at B for a Paxis-lach roundbeard store bolt C, which is fastened at bottom side of magnet by a flut.

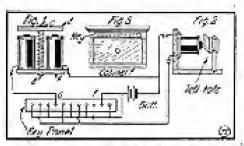
at bottom side of magnet by a fast.

A light spring D with the nut at top of bolt helds a piece of %-inch from E away from magnets until the current magnetizes and draws the from down, thereby unlocking the drawer.

Having fittished the lock, we may now turn our attention to the key, or secret switch, which unlocks the drawer. On the top part of the drawer place a thin strip of wood with bress upholstery tacks mounted and wired as shown.

By looking at the diagram is will be seen that in order to open the drawer a connection has got to be made between F and G, as all other wires connect with the tell-take signal shown in Fig. 2.

This is morely a single magnet mounted on a strip of wood with a small piece of



Stagnetic Lack and Tellstate for Drawers, qui-

tight iron mounted on a stick which is hinged on the bottom so that the currenwill draw the from strip onto the magnet. This magnet I have enclosed, tegether with two dry cells, in a loss and placed behind the cabinet so that if a stranger opened the drawer he could not tower the signal

This device has given excellent service, besides saving me the price of an expensive lock and, although it has been in use for a long time, both signal and lock are in good condition. Contributed by GEORGE H. ROBERTS.

STATIC ELECTRICITY FROM SUIT CASE.

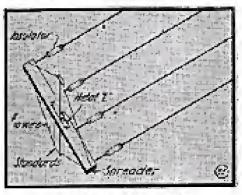
I thought I would tell you of a strange experiment in static electricity I have made absidentally. I have a leather suit case which I carry around daily. I have noticed white walking, if I brought stop farger close to the suit case brass lock I left a slight twinge. For a long while I would arrived at the conclusion that the suit case continually rubbing against my woolen coat caused a clearge of static electricity, which stored itself in the lock. Then what the finger was beengle close to the lock it discharged itself into the body, and thence into the ground.

E. CAPILLON.

THIRD PRIZE \$1.00.

BRACE FOR AERIAL SPREADERS.

The illustration shows the method I use to prevent my 12-first spreaders fromwarping. Two wooden standards one foot long are screned to the center of the speeder, over which is drawn a No. 10-



Aerial Sprauder Strengthening.

copper wire. I have been using such an arrangement for a year with perfect satusfaction.

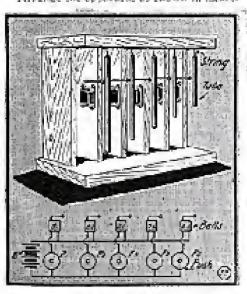
Contributed by

ARTHUR R. DARLING.

A SIMPLE ELECTRIC CHIME.

A simple but harmonic electric chime (23), he modely anyone. The following material will be needed in constructing this simple chime: Two pieces of oak, 12x5x34 inches; 10 electric hells, with gongs removed; 10 pushburious, 10 brass tubes, %, inch in diameter; the largest tube should be 7 inches long and the smallest tube 2 inches long, while the other tubes should vary in \$4-inch lengths.

Arrange the apparatus as shown in figure-



An Efecteie Chime.

Care should be taken to allow the bress tubes to swing freely, as the more of the tubes depends upon the vibrations received from the striking of the clopper. The connections are shown in sketch. The tubes are best bring on strings.

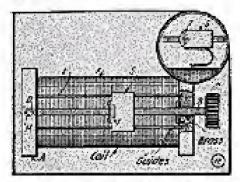
A PRECISION TUNING INDUCT-ANCE.

When it is desired to tune finely a cortain circuit the know K is turned, and also the threaded rod turns. Because it is fixed and cannot mave, the not T (and conse-innelly the sider S) is moved up and down the cod at will. It is recommended that as course a pitch or spiral as possible be used, of the type used in automatic drills, etc. Thus the maximum of movement of the allder is obtained by minimum. may enent of the knob.

The red R. being pivoted in D. makes contact therewith. The bolt M of binding

post completes the commediac.

A double or triple slide coil may be op-crated in this manner by reducing the di-



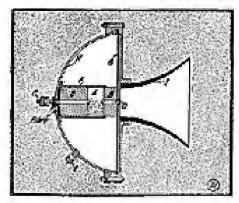
Floriy Adjustable Tuning Cult.

mensions (diameter) of rods R and E E. and of slider 5.

The whole cost may be enclosed by thin wooden sides. It then presents a very neat appearance. No iron should be used in the construction of this tuner. Contributed by A. D. R. FSASER.

MAKING A TELEPHONE TRANS. MITTER.

The disgram shows how I made a simple telephone transmitter. H, the case, is a gong from an old bell; B, B are two pieces of carlien cut from an old battery, each having a hole in the center; I is a paper tale to hold the crushed carbon or better regular carbon granules A. D is a hinding



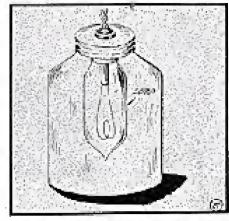
Midsephone Made Out of Dell Dong.

(set to hold the earbon button to the diaphragm G, which is made of tin or ferrotype from cut to the right size and held by a wooden ring as indicated. At C is a binding post holding the batton B to the back of the gong, from which the button and post are carefully insulated. E designates a backing post attached directly to the gong. and forms the other connection for the circuit. I is the monthplore. The diagram is self-explanatory."

Contributed by ALLEN SJOHOLM.

A RUGGED DARK-ROOM LAMP.

Procure an ordinary two-quart glass fruit jus, break out the purcelans liming in the cover and cut a hole through the metal just large enough to fit over the socket as shown. Then solder cover and sucket to-



Batt: Room Ruby Lamp in a Bostle, Bland in Upard.

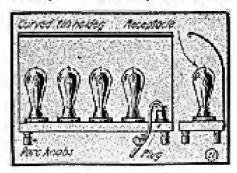
Line the inside of the jar with gether. Line the induce of the jar warrition thicknesses of grange paper. One can almost use an 8-C. P. lamp, lost the heat is a 4-C. P. lamp. Screw the lampings the socket and turn the corer onto the jar. With cord and plug of proper length the light can be readily moved where needed about the dark-room table.

HOW TO MAKE AN ELECTRIC HEATER.

Everyone appreciates the grateful heat and cheerful glow of the luminous electric heater or the modern open fire. It is very useful wherever a small amount of lexit is desired quickly. The home-mode electric heater here described is especially desirable for the sickroom, nersety and cory (foliantis.

Procure about 4 to 5 porcelain lamp re-ceptanies and mount these on a hardwood tore. When you mount the receptacles remember that the width between them should be large enough to allow the lamp bulbs to be screwed in and out without

Connect receptacks in parallel as shown drawing. The last socket is left without in drawing. a lamp, as this one will receive the plug. The other end of the cord has also a plug for current connection. When all is finished so far, make from sheet tile or polished copper a hood as shown in drawing. The purpose of this bood is to reflect the heat which the lamps develop. The amount of heat can be warfed by using higher candle-power lamps and the heat can also be regulared by parrly unscrewing some of the lamps. The more lamps there are on,



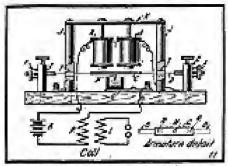
meetric Lamp Stove For the Chilly Evenings. the more hear, and vice verse. Percelain knows are best screwed under the base to

MAKING A HIGH SPEED INTER-RUPTER

In the accompanying drawing is shown at intercupter for producing extra high frequencies. This interrupter when propcity made will interrupt circuits from 30

20 000 periods per second.

At A A are two magnets taken from an old electric hell which are supported on an from roke K, as shown. C is the actuative, studie from a piece of soft from about N. So mone. An ordinary steel bit. H is No. 20 gauge. An ordinary steel pin H is riveted to the order of this armature. Two short proces of brass spring D D are then elveted to the ends of the armature by two small rivets R. R. The standards E. E. and J. J. are made of brass. Two holes I I are defilled through each standard J. J. These Brilled through each standard J J. holes are to be made large enough to let the beast springs D D vibrate freely. A

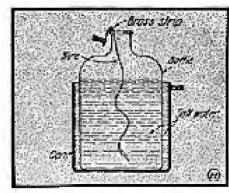


Extremely High Speed Vibrating Interfactor.

small brase cup is taken from an old bat-tery and should be fastered to the least, as shown at G. Now fill the cup about three-quarters full of mercury and connect as infigured. Any frequency may be obtained just by varying the tension of the two springs D D. Two No. 8-32 screws slip through holes in posts E. having clamping screws. Fine tension adjustment is affected by thursh-ness F. This intersupter works very good in connection with medical wireless coils or X-ray toils.

A CHEAP BUT EFFICIENT SEND-ING CONDENSER.

The parts needed for this condenser can be found in nearly every home. It con-sists of a tin can a large bottle free from



Sait Water Type Leyden Jer.

ilaws, two binding posts, wire and salt. water. Little seed be said, as the diagram speaks for itself. The sain water acts the same as the timfol in Leyden jars. With one of these condensers, a blinch coil and no helix, I get a very good spark.

Contributed by RAY ATKINS.

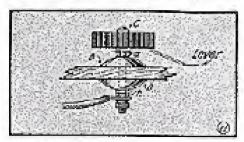
set as feet in supporting the heater above the flage. If the most cheerful effect is desired irrested globes can be employed.

A HOME-MADE SWITCH LEVER.

An efficient switch lever for use on loose couplers industive timers, etc., having a much neater approximate than the ordinary lever, can be constructed cheaply in the fellowing manner:

A brass lever is cut from a piece of sheet brass 2" long. 36" wide at one end, 36" wide at the other; the narrow end is rounded slightly. A 34" hale is hored in the mide and the wide end.

The thumb screw is made from a black checker 11%" in diameter; the claim side is the seed up and a 3%" hole bored in its sense. A stove both 1%" long and 3%" in diameter, the select in control broader in control broader. dinmeter, threaded its entire length, is slipped through the checker and the brain lever secured family to the lottern of the checker by the aut "a," as shown in the



Switch Construction for Tupers, etc.,

figure. A small washer had better be used, as shown at "c," to prevent the head of

the bolt from pulling through the checker.

Two tim receing caps "B," with \$6" notes in their centers, are used to grip the surface tightly, of whatever they are attached so. Three note, "none," are sow needed; one to tighten the boil properly, the other for a check out to hold the first, and the third to cheep the wire connection.

Contributed by

ARTHUR R. DARLING,

AN ELECTRO-MAGNETIC SCREW-DRIVER.

A magnetic screwdriver is very conventent in starting screws in places difficult to The magnetic screwdriver hereget at. with aboven is simple to sit up. At first, wrap the seed shock with a layer of paper or tape and then wind evenly four layers of No. 24-gauge copper magnet wire.

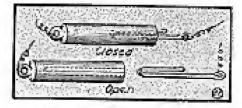


ibis Screwdrives Holds Screws on Ha End-by Magnetism.

which can be obtained in any electrical store. After the wire has been wound, toake a strap key of brass or other con-ductive material. A small rubber knob is next placed on the end of the strap key as shown. This key is then fastened to the handle by means of brass screws. A small tack or flat-head serew is hammered on the handle in order to make the second contaget. One of the wares from the cost of wire is connected to this tack, while the other wire is brought to the end of the handle. Another wise is connected to the strap key and with in these wires are braided together. These wires are taped to the handle with friction tape as shown, Every experimenter and electrician should have a screwdriver of this kind in his shop or laboratory tool kit, as a great deal of sine is saved with it. The drawing is self-explanatory. A few dry cells will suoply the necessary current required.

A HANDY ELECTRIC COUPLING.

A very useful electric coupling can be made from a class such as that used in fastening head necklases. They are generaily made with a small ring on each hat! for factoring to the necklase, and the electric wire can be easily twisted around these rings. Also it is easy to make similar



Enally Made Cleetric Commantur,

complings for battery discuits on the style illustrated from a piece of brass to's; and flat brass spring bent U pluned.

METHOD OF PREPARING LEAD PEROXIDE.

Corefully treas "red lead" with pure pitric acid (H NG2). Collect the remaining valistance when the acid has been poured off; wash it well and liller it carefully, drying until it is a thick paste. Now mould it into pellets in a piece of glass title with a mooden cammer. Dry and place in detector stand. Contributed by A. D. R. FRASER.

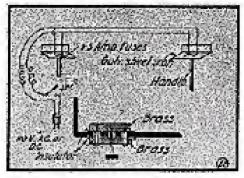
ELECTRICAL IGNITER FLASHLIGHT.

As there are many photographers taking photographs where considerable quantities of flashlight powder is to be used, the following description of a very simple electric igniter may not be amiss:

As the sketch indicates, a right-angled sheet iron tray is mounted on a handle and in the center of the tray is placed two insulated brass clamps or contacts. These contacts are electrically connected to a piece of standard lamp cord, which may be joined by an attachment plug into any electric lamp socket.

Some small lead first who of about 3. amperes inpacity, or better, I outpere size, is spread across the small space, about I inch forg, between the connection clamps.

When the current is necosal on by a switch in the circuit or the key on the socket into which the cord terminal is



Blectric legiter for Photo Flash Powder.

plugged, the fuse wire is melted and ignites the thish powder.

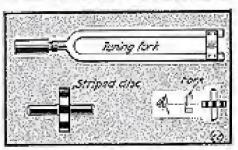
This arrangement has been used pracsleadly, with execilent results, by one of the largest commercial photographers in the equatry.

The New York-San Francisco telephone line is 3,890 miles long. There are two circuits, each using 6,780 miles of harddrawn copper wire.

TUNING FORK AS SYNCHRONO-SCOPE.

Probably one of the simplest ways of judging the synchronism of an A. C. in-duction motor, especially when the motor is of the synchronous type as used in taking

officiare machines, is here described.
This consists simply of a large tuning fork about I foot long, which is struck smoothy on the hand, and at the two free ends of the fock two metal leaves pass each other in a vibratery manner. In these two leaves there are two slots about % inch long by 1/32 inch wife. To check the motor speed, which motor, by the way, has a rotating disc on the shaft painted alternately with black and white stripes about 55 inch wide, as shown in illustration, this



Tuning Fork Forms Simple Sendimented open

disc is viewed through the vibrating slits just mentioned. If the motor is in perfect synchronism with the A. C. supply and with the generator at the other end of the line, the stripes on the rotating disc appear to be stationary. If the motor is running faster than it should the disc appears to drift forward. If it is running too slow the rotating striped disc appears to move hankward, or vine versa, depending upon the direction of rotation of the motor.

Of oncise the timing fork used must be of the proper vibration note, corresponding to the frequency of the motor current, or rather the synchronous speed of the motor and the number of stripes on the disc. Any physics book gives these frequency equivalents.

A SIMPLE ELECTRIC FLASHER.

Here is a simple and cheap dasher for



A Thermostatic Electric Playler.

use on hattery circuits, for flashing small battery large or any other purpose that may suggest itself to the experimenter.

At A is a piece of steel Waxhan inches;

B are two wood serews; C is a piece of brass; D, platinum contacts, and F, a set serew for adjusting this device. The winding is composed of about 8 feet of No. 30single silk-invered wire. One end is connected to the binding post and the other

end soldered to the spring, as shown.
When more than about 1% nuperes flow through the fine winding the latter heatsup and causes the spring to bend so as 40 break the circuit at the contacts. When it cools off the spring straightens out again

and closes the elseuit.

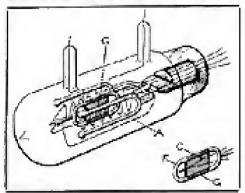
This opening and closing action repeats Itself every few seconds when the apparatus is properly adjusted. Different sizes of part A, and also the wire used, should be tried for various requirements until the best results are obtained.



ELECTRICAL-MAGAZINE-REVIEW&

PURE ELECTRON DISCHARGE FOR WIRELESS TELEGRAPHY AND TELEPHONY.

The electron emission from heated metals at very low pressure has been investigated by scientists for many years, and the observations have been generally explained to be the result of chemical reactions with slight traces of gas, in the first half of an article by Dr. Irving Lang-



The New "Plintron" Vacuum Bulb Rectifier for Wireless Work.

main, and which is arranged in the form of a historical review, are related the experiments leading to the conclusion of the existence of pure electron emission in even the highest attainable vacua. After outlining the fundamental principles which govern this phenomenon the author shows how, through the medium of the kecatron (a hot-blament vacuum rectifier) and the gliatron (a new type of amplifier), both of which employ the pure electron emission from hested metals in extremely high vacua, a very simple and successful equipment has been produced to send and receive radio-telegraphic and radio-telephonic messages by trigger control of the tube. As much as 2 k.w. can be controlled in this way by an unlinary microphone.

In the construction of bliotroms it has been found desirable to make the wires constituting the grid of as small cross-gection as possible. In this way, even when a positive potential is applied to the grid, the current that flows to the grid may be made extremely small. The use of very fine wire is made possible by using a frame of glass, metal or other suitable insterial to support the grid. Thus, in figure, the filment G is mounted in the center of a frame made of glass rods, on which the file grid wire is wound by means of a latte. The grid may thus consist of tungston wires of a diameter as small as 0.91 mm. and these may be speech as close as 100 turns per centimeter, or even more.—General Electric Resister.

SPEED OF WIRELESS.

A paper presented before the French Academy of Sciences on the speed of propagation of the craves used in wireless telegraphy over the surface of the earth. The method used is as follows: Station I emits a signal to which Station I replies by a second signal. In Station I the time I, is measured between the departure of the first signal and the arrival of the second, and in Station 2 the time I, is measured between the reception of the first and the emission of the second signal. The time I, — I is the time of transmission of the first signal from 1 to 2 and of the feture signal from 2 to 1. The time I, — I are measured by means of photographic microgalizationageters. By this method it is

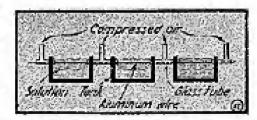
possible to measure the interval of time with an absolute precision which may become 20000i second. The wireless-telesgraph waves are propagated over the eigenfuce of the carth with a speed apparently slightly less than the speed of light.— Riestrinal World.

ELECTROLYTIC INSULATION OF ALUMINUM WIRE.

An interesting use of the exide film always present on aluminum wire and methods of artificially building up this film, which serves as an electric insulance, is described by G. E. Skinner and L. W. Chubb.

Numerous kinds of efectsolytic baths were tried by the authors of the paper, and considerable practical results obtained. The film insulation, even after being built up, as explained, is very thin, and thus a considerable saving in the space factor is required.

In the subsequent development continuous methods were employed in which the wire as an anode was drawn through a bath of electrolyte. In all the earlier methods of meating the wire passed over several abeaus with the result that it became handmed in the process. A straight-through method, as shown in the figure, was, therefore, tried and found to give very satisfactory results. Five tanks arranged in a straight line were used. The first and last contained but water for washing and the middle three electrolyte. The wire passed from tank to tank through glass tubes and the solutions were kept



Method of Insulating Atuminum Wire Electroty thanty.

aptire by blowing all through a tube scaled to the center of the mannering tubes. In this method there was again no column of electrolyte at the point of entrance, and it was at first necessary to form the coating in two steps of 200 and 400 volts respectively. This was supersoded by the present method in which the wise also goes traight through and the increase in voltage is again established through a small weir and spout through which the wire often. This latest apparatus has the additional advantage of allowing the security and starting of the wire without through.—The Electrician, London.

ELECTROLYTIC PRODUCTION OF OXYGEN,

Several factories in St. Louis are new engaged in the electrolytic production of the commercial oxygen gas. According to the "Engineer" the electrolyte used is a 10 or 15 per cent, solution of either caustic soda or countie potash. As direct current traverses the electrolyte the oxygen given off at one electrode is collected and compressed, while the hydrogen given off at the other electrode is allowed to escape in one well-equipped oxygen factory in St. Louis it is claimed that the oxygen company can produce obest three cubic feet of oxygen gas for each kilowatt-hour axed.

GALVANIC CELL WHICH RE-VERSES ITS POLARITY.

When two plates—one of sine and the other of finited copper coated on one surface with selenium and varnished with examel over the remainder of its surface—are immersed in tap water the electric current through a gaivanometer connected to the plates shows that in the dark the zine is electro-positive to the selenium, while the result of light falling on the selenium is to increase the effect, says A. A. Campbell-Swinton in The Electrician, London. If, however, instead of zine, tarbon or copper is employed for the non-coated plate, the interesting result is obtained that, while the selenium proves to be electro-positive to the carbon or copper when is is illuminated, this being easily shown by the deflections of the galvanometer in contrary directions as the light is turned on and off.

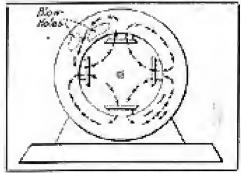
SLOW CATHODE RAYS.

In a recent lecture by Sir J. J. Thomson, at the Royal Institution, London, the election discharge at different voltages, in a Coolidge type evacuated but) were described. A curve was given which showed the relation between the voltage applied and the munder of negative telectrons radiated. The curve and also the experiments made, indicated that as least 15 voltaway necessary to produce any appreciable radiation—The Electrician, London.

A horse is very sensitive to electrical shocks and nearly always succumbs to \$50 volt current. About 1,800 volts is required to kill a man ordinarily in the electric chair.

X-RAY TO LOCATE CAUSE OF BRUSH TROUBLES.

In electrical machines with cast iron of steel frames blow-holes may be present and may be large enough to increase greatly the reluctance of a section of the magnetic circuit. The reluctance being higher in one section of the circuit than in others will cause a lower voltage to be developed to a corresponding section of the armstane, and local distuitating currents will result. The blow-holes being convealed, it has often been found quite difficult to determine definitely whether or



X-Raya Show up Blow Holes in Dynamic Custings.

not they are the real cause of the trouble. According to E. H. Martindale, of the National Carbon Company, says Electrical World, steps are now being taken to use X-ray machine to search for blow-holes in machine costings whenever it is suspected that high rejuctance in the magnetic circuit is musing brush trouble,



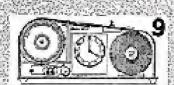
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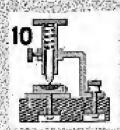
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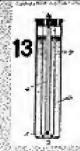


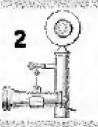


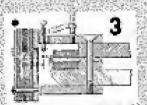


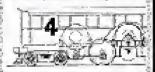


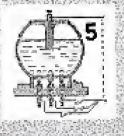
















LAMINATED IRON CORE (Fig. 1)—An arrangement, of item laminations in every, making juints come in proper relation to sing-notic flux path.

ALTICIATED FIRE ALARM (Fig. 2)—A simple method to making "Comman" when a fire orders 48 a subscriber's house. A fusible step supports the acceler branket, as siebech

TELEPHONE REPEATER (Fig. 1)—Improved form of tele-phone roley acting deflerequally. The engines coil automa accepture, pointed by levers to double prison materphone.

ELECTRIC LOCOMOTIVE (Fig. 6)—The patent relates to the supplet: of powerful closure weight above excursions driving wheels, as shown, similar to the Pennsylvania Railroad type.

ELECTROLYTHE ENTERRESTER (Fig. 3)—laprosence, in short-alwide interrupter consisting of one or more anode, projecting spaced as seen, in the bottom of the executive container. Cathodo extens at the top of container. This idea allows the gas bubbles in arise freely from the abouter.

EPARK-PILIG TROUBLE DETECTOR (Fig. 6)-A device to be used on mean care, slow connected in the spacking circuits, so that each syark may be observed as it passes through this series detector.

MAGNICTIC VALVE (Fig. 1)—An electro-magnet is actuated to appears steam, gas or matter valve, in abuse, and they is provided with switch accommon, ore, for clasing and opening stream.

DRY CELL (Fig. 8)—traprovement in dry cell controllering by which a rigid class is placed rigidly in the upper parties of cell against the mastere in order to retain same fitting.

ELECTRIC APPOINTMENT ANNUUNCER (Fig. 9)—A novel appointment annuancy which operates by means of perforated paper strips, a clock, together with electric hell and battery.

RADGO HETECTOR (Fig. 10)—New "Pickerel" detector, cover-for particularly the adjustment of contact point on mineral. Several movements are possible for the point.

ATTACHMENT FOR TELEPHONE TRANSMITTER 4Fig. 115

A binged cover is provided for are on pilephone remarkings broads pieces, presumably to been the dark suc. 215

MAGNICIEC SCHABATOR offig. 151-Checks, form of magnitic separator for arounding their fillings from brane, etc. Beats sleere (4) can be allo down by landle (6) so as to though off from after it has been attracted.

STORAGE RATTERY (Fig. 12)—Congeing an outer shell with rice amplying on the inner shriftee, opentioning a negative engineer also other shell having an unit surface of copper consigner for the positive ricellude. Inner werings at inner shell, in one amplying with lead plate within it, constituting the negative starting.

MAGNETIC CLUTCH FOR SHAPTS (Fig. 14) - Strong respect cell centrellable from switch and battery, etc., causes two parts of check to be held together conjectically and vice verse.

ELECTRIC RORN (For. 16)—Displicages to vibrated by means of teath on either of same, certify in commer recommently with severy my toolked resugnice of relation factor, as seen.

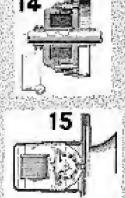
ELECTRO PNEUMATIC HORS (Fig. 16)—A clever sambles tion of electric and presented both, which is very compact. Can be accusted either by an both or electric bottom.

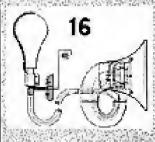
FLECTRIC WATER FOUNTAIN (Fig. 12)—Water featuring, basing electric gump to enclude water through meanle, sic, and also provided with electric comp in content of water for timminating effects.

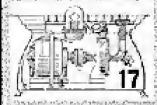
OSCILLATING PAN (Fig. 18)—begroved (orm of additating electric flat. Fan major has gent attributed to entry came to be mechanically uncollected to and ire, in the metal manner.

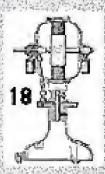
TELEGRAPH KEV (Fig. 18).—Vibrating form of second telegraphs any arranged to approximately close the circuit for certain length of time as for data and chapter.

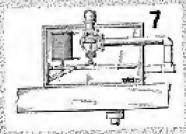
(Copies of any of the above patents will be supplied at me, each by the publishers.)

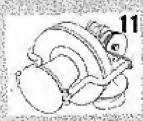




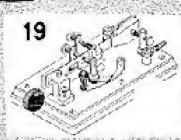














SRUETAMA Ent ONOMA



AMATEUR RADIO STATION CONTEST.

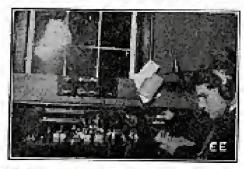
Monthly Prize, \$3.00.

This month's price winner.

HENDRIX LABORATORY.

I am a regular reader of The Electrical Experimenter, and as I have made my wireless set what it is by reading this paper I would like to see a picture of my station in it. My aerial is 150 feet long, 105 feet above the ground at one end and 50 feet high at the other and. I have sev-50 feet high at the other end. I have seven strands of solid copper wire No. 12 on 12-feet aprenders. The ground is a 12foot galvanized iron pipe driven II feet into the ground.

My receiving set is composed of loading cail, loose coupler which tenes to about 2,500 meters, a rotary variable condensor in the primary circuit of the loose coupler, and a tebular yaciable condenser in the secondary circuit. I have two pairs of phones, one pair of 3,000 olons and one pair of 2,000 olons; potentiometer for electrolytic detector; also E. J. Co. Radioson, Ferron, Turney crystaloi, galena and peri-kon detectors. These are arranged on a six-point switch, I have a fixed blocking condenser with switches for adjustment. and a fixed condenser with switch across observe. A buzzer text is also included in the set, which incorporates a common buzeer, an amplifier and battery and pushbutton. A single slide timing coil is also shown in the picture, which, by means of



Mr. Histon Hendris Processing Arlington Time Signals Vin Redic.

a switch, may be thrown in as an extra

leading coil.

Here is a list of a few of the stations. which I receive from: N. A. A. Arlington, comes in very scrong; N. A. R. Ker West, comes in quite strong; I. W. C. O. Springfield, III., quite strong. I also get Trackerton. Sayville and Celon sometimes on experience of the company certionally good nights. I moved like to exchange photos of niertless sets with other amatener,

BIRAM HENDRIX.

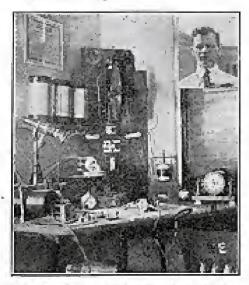
Wellsboro, Po.

PHIL SCHMITT'S RADIO EQUIP. MENT.

l are sending you a picture of my radio set. My transformer is 14-K, V, A, I am using a quenched and rotary gap. The oscillation transformer is of Telefunken transformer all the decemberance are use type. Almost all the instruments are my own make and style, made mostly from R. I. Co. goods. For an aerial I am using one wire about 500 feet long and 60 feet high. I am griding excellent results with The station is located in my bedroom, and the first and just thing when getting up or going to hoo is to sit come and listen in or flash off a few "good mornings" or

"good nights" to my radio chams. I have been a seader of The Electrical Experi-menter ever since its first issue and it in a been a great help for my experimental work, PHIL SCHMITT.

New York City.



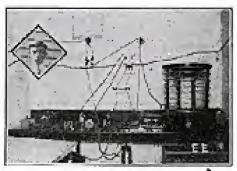
Sahmitt and Excellent Wireless Equipment.

PARK SNYDERS RADIO STATION.

The transmitting set of my radio station consists of the dollowing instruments: Oneinch spark coil, wireless key, a large aluminum wire helix, two 1-quart Leyden jara and spark gap. The helix and the Leyden are are hance-made and the other hestruments are factory-made.

My receiving set is composed of an Arrenloose coupler, home-made leading coil. Brandes' 2,000 alon bond set, an E. I. Co. Universal princeral detector and a catwhisker defector, a fixed condenser and a

Mandock rotary variable condenser.
The aerial is 20 feet high at one end and 40 feet high at the other end, and is 85 feet long. It is supported at both ends by iron masts made of 1 and 2-inch pipes and is braced every 20 feet by three guy-wires. The aerial proper consists of four No. 14 aluminum wires, each 65 feet long and spaced 2 feet apart on 0-foot spreaders. These four wires are connected together at both ends. My lead-in is a No. 6 rubber insulated copper wire and is 20 feet long. This wire runs from the perial to the



Park Snyder and this Wireless Transmitting and Receiving Set.

ground switch and from there a No. 14 copper wise rully to my instruments. use two of the wires for sending and all

four of them for receiving.

On the wall is seen my agria; switch and also a line switch. With this set I have no trouble in "tatking" with other operators

who live within a radius of 10 miles. I have had very good results in long distance secciving work and I hope to have better fack soon, as I am going to add another loose coupler and variable condenser to PARK SNYDER.

Connersville, Ind.

THE LEHICH WIRELESS ASSO-CIATION.

The Lehigh Wireless Association, with headquarters at Allentown, Ps., was or-ganized Oct. 2, 1914. About a month ago-the following officers were elected:

Farl Back, president; James Gurdner, vice-president; Arthur Lentz, treasurer; Arthur C. James, scoretary.

Almost all the members of the associa-

tion have up-to-date transmitting and regoiving sets and are also licensed operators. Meetings are held weekly at the home of the president.

The association has a I-K.W. transmitting set, which can transmit about 100 miles, and massages have been received from NAR, NAU, NAW and WCC, and would like to computate with other missless and accompanient with other missless areas and all the computations. wireless associations. All communications are to be addressed to Arthur C. Jacoby, secretary, 517 Linden street, Allentown, Pa.

WIRELESS SET OF ARTHUR JACOBY.

Herewich is a flashlight photograph of my wireless station. Although I am not a



Arthur J. Jacoby and His Well Pinished Radio Set.

subscriber I get the magazine every month in town. My aerial is 100 feet long. 76 feet high at one end and about 45 feet at the other end, composed of four strands

The station is equipped with a complete renaizing and sending set. The receiving set consists of a loose coupler, two loading mils, three detentors, galena, perikon and crystaloi, one variable condenser, fixed condenser and a pair of 2,000-phys 'phones,

The sending set consists of 1-inch spark still, condenser, belia, stark gap and key, and can transmit about five miles. The station has a small switch-board with all the instruments wired to it.

The station iss a receiving range of 1,000. to 1,600 miles day and might.
ARTHUR C. JACOBY.

Allegtown, Pt.

ALBERT MEDAL TO MARCONI.

The Albert medal of the Royal Society. of Aris, London, was recently presented to William Macconi. The medal was instituted in 1863, when the Prince Consort was president of the society. The medal is awarded annually for 'distinguished medit in promoting arts, remularities and commence.

Phoney Patents

Under this breding we will publish hereafter electrical or mechanical tions which our clover fusculars, for reasons best known to themselves, have as yet not putented. We furthermore unnounce the great spening

PHONEY PATENT OFFIZZ

For the relief of all suffering daily investions in this country as well as the entire universe.

We will revolutionize the Patent husiness immediately and OFFER

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PHONEY PATENT OFFIZZ

ANANIAS GASILOWER OF CHAUTOKA

STRETCHMOTOR Specification of Phoney Patent Potented June 63, 1915

No. 000934

TO ALL WHOM IT DOES NOT CON-CERNz

Be it known that I, Ananias Gasblower, a resident of Chantoka, in the curatty of Ishkatibble, in the state of Wis, have inyeared a new and useful, revolutionizing means of conserving power, which since the beginning of the world has good to waste.

The object of this invention is to provide a assent of collecting and storing the treengulous amount of power expended when man stretches himself after awakening in the marring. Up to now this power has gone to waste, but my new invention which I term the stretchmotor, will do away with all this. It has been estimated that a full grown man giving a healthy stretch produces an average pres-sure at the foot of his bod of about 190 the. Most individuals stretch themselves from 4 to 7 times in the morning, each stretch lasting about 4 seconds. This means that a total energy is developed that could life a weight of from 480 to 840 life. about 2 feet above the floor -a tremendous power. Lazy people or those food or stretching will even do better. My calculations show that if the entire stretching power of every citizen of a town of 100,000 people could be consented and stored of only one morning, the turing city could be lighted up with electricity for 4 days, 6 hours, 12 minutes and 19 seconds.

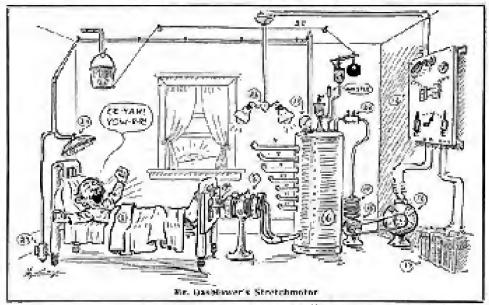
With this object in view my invention consists essentially of an individual, a morning, a bed, an air compressor, a dynamo, a storage battery.

In the drawings which accompany and form part of this specification I have illescrated in diagram several features which embody the subject of my invention, and , how the secretainment is operated in pracfice.

In the drawing (1) represents the individual, just awakening; (2) is the heal; (3) is the footboard; (4) are the connecting rods connecting the footboard with the platon of the air compressor (b); (6) is the compressed air tank in which the re-ergy is stored; (7), (8), (9), (10), (11), (12) and (13) are pipes contag from the Application fired November 39th, 1769 other bed-rooms of the house, each pipe being connected to a piston and a com-pressor, which in turn are attached to the other heds throughout the house. (14) is the piston of the compressed air motor the paston of the temperased are motor (15), which is belied to the dynamo (16), which is turn charges the storage battery (17); (18) is the switchboard and automatic out-out; (19) is the air pressure gauge; (20) the safety valve. This safety valve has a whistle attached to it; thus if the members of the family generate too much energy the whistle will blow as a

which is upset thereby and its contents are poured over the individual (1), extinguishing him completely. (21) Are the electric lights, lighted from the storage hattery (17). As soon as the pressure within the tank (6) reaches 6,000 lbs. per square inch, an automatic valve (22) opens and the compressed air flows in the piston

(14), which operates the compressed air motor (15).
(21) Is a compressed air blast which scares automatically after the individual begins stretching. This air blast blows a



waening to all not to stretch themselves too long or too strengly. At (24) another valve is shown. This is a final emergency valve, it is technically called the Ultimatum valve. If the individual pays no heed to the sounding of the whistle and persists in the scanding of the whistig and persects in stretching lamself the pressure in the tank (0) may rise up to 12,000 lbs, per square inch. As soon as this happens the Ulti-mation valve (34) opens, which in turn pulls down the string (25). This string runs over several pulleys to the water pail (26).

strong blast of air in the individual's face, which is so disagreeable that he will get up and remain up. This discourages in-dividuals from staying in bed once awake, and furthermore awakens them thoroughly. As spon as the occupant leaves the bed a spring (27) closes the airblast automatically.

In testimony whereaf I have hereento subscribed my name this 35th day of November, 1760.

ANANIAS GASSLOWER

ELECTRIC FLY KIL GUARANTEED TO WORK. KILLER

While there have been many electrical insect traps and annihilators perfected and patented, one of the most movel, perhaps, is described below by the aid of the sketch . shown.

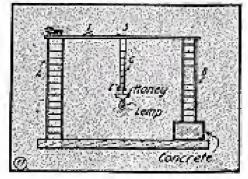
The inventor of this marvelous electrical "Fly Annihilator" has explained the prim-

ciple of it as follows:

The fly is attracted to the device first by the odor of honey or molesses, which is plated in a small, increasible cup mounted over the locandescent lamp as indicated. The fly walks up the tadder "A" and along the feetpath provided for his majesty at the top of the auttomant.

The illustration shows the fly walking approximation an elegatical switch "I," and when

he passes over same in his quest for the



honey the electric lump is thereby switched

on. He then proceeds to climb rapidly down the ladder "C" coward the laney, guided, of course, now by the illumination from tile lamp.

When he reaches she trigger switch "2" the lamp is excinguished, and at the same time a small spring actuated barrier "3" stands up vertically, thereby effectually cutting off his retreat.

The little fly now starts to walk back up the ladder "f," and when he arrives at the top he has but one alternative and that is to walk along the footpath and down the indee "B" to terra firms.

Sail to relate, there are about three steps suisting in the ladder "H," and before he has time to "watch his step" he is precipitated violently onto the concrete block below and dashes his brains out.

JUESTION



This department is for the sale heacht of the electrical especiments. Questions will be answered here for the benefit of all, but only matter of sufficient interest will be published. Rules under which questions will be narwered:

a. Only three questions can be submitted to be answered.

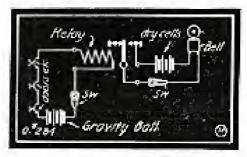
a. Only one side of short to be written (a) matter must be typewritten, or class written in this, no penaltic matter considered.

3. Sketchen, diagrams, etc., must be on separate shorts. Questions addressed to this department cannot be surveyed by mail.

CLOSED CIRCUIT BURGLAR. ALARMS.

(234.) Leopold M .-- , Brooklyn, N. Y., asks several electric burglar alarm ques-Cicios :

A. I. You will undowbtedly have to employ a closed circuit battery, such as the geneity cell, for your particular form of berglar alann. Diagram is given showing how this is used with a relay, and if the ware in the main circuit is cut by an 90truder at a window, for instance, then the



Cinsed Cityuit Burglar Allein.

battery cutrest, of course, will be out off from the relay and the armature of same will be released by its magnets; this al-lows the armature to drop back against the consact screw, as will be preceived, thus closing the plarm bell circuit.

The relay in this case should have a fairly high resistance of, say, 150 olims' value; three to four gravity or crow-foot cells will be all right for the work. Ordinary dry cells can, of course, he used in the local (open) afarm bell elequit to the num-ber of three or four for a medium-size hall, etc.

STATUS OF PATENTED ARTICLES. (285.) William Foreste, Petham Manor, N. Y., inquires as to the slatus of patents on wireless devices as related to manu-

facturing, etc.:
A. l. You can manufacture or sell wireless and electrical apparatus as you mention without obtaining any license, except instruments which are patented and already sold under a license, etc. In this case you will, of course, have to take up the matter with the owners of the patent or the company who already builds the instrument. Otherwise you are liable to get yearself into no end of trauble. We may see in this district. may say in this direction that from many cases which have been settled in the past of such a character it has been the rule that invariably the party making apparatus without license rights from the patent owners have had to pay all the patent royalty accruing on the total sales of such instruments for the total period during which they were manufactured prior to court action.

We are not familiar with the de-A. 2. tails of the wireless system utilized by Mr. Eugene Dynner, of Guttenberg, N. J., but you can, of course, write to him and he will be undoubtedly glad to give informa-

tion you desire.

TRANS ATLANTIC RADIO PLANTS.

(SSG) Donald Rockwell, Welisbero, Pa., wants to know why the powerful radio station at Arlington, Va., was not shown

on the map of Transatlantic sadio estations published in the March Electrical Experimennier i

The reason why the radio station at Arlangton. Va., was not shown in the recent Transaclantic Radio Map was due to the fact that Arlington is not considered, in the ordinary sense, a Transatlantic wire-less station. While the signals from Arlington have been heard across the ocean it does not do this work regularly, as is the case with the German stations at Tuckerton, N. J., and Sayville, L. I.

We have no data on the operating range of the radio station at Colon, Panama, but it has been beard in New York City a great number of times by experimental

wireless stations.

Want to Swap?

Zamanian and a same and a same and a same a

If you have anything to buy, sell or exchange and want to make sure of doing it quickly and at an insignificant cost advertise in the

Scientific Exchange Columns

The Electricat Experimenter

You will find advertised in these columns:

Photographic supplies, Phonographs, Wireless Apparatus, Electrical goods, Bieyeles, Motorcycles, Rifles, Gusofine Engines, Microscopes, Books, Skates, Typewriters, Etc.

The owners of those things wish to "swap" them for something clae, something which you may have.

The Rates

One cent per word (name and address to be counted) minimum space 8 lines. Average 7 words agate to the line. Remittance mus! accompany all orders.

The Classified Columns of the ELECTRICAL EXPERIMENTER GET RESULTS

More than 35,000 Electrical Experimenters will see your ad.

इक्ताप्ता प्राप्ता का अने के कि जा का अपने का STORAGE BATTERY TROUBLE.

(287.) Fred Taylor, Norfolk, Conn., says his storage battery will not hold a charge for any length of time and wants

advice on his probable trouble:

A. I. We do not know what your battery trouble may be, but possibly the cells need washing out thoroughly, as there may be some collection of sediment on the bertom of the jars. In this case the electrolyte should be poured out of the jars and they can then be filled with clean water and flushed out several times, till the water flows clean. The electrolyte should then be strained through a piece of fine cloth and seplaced in the battery. Add distilled

water to bring its specific gravity to proper point if high in density. Also add distilled. water only in filling up cells to cover plates. when exposed by evaporation of water in electrolyte.

In some cases the battery plates become covered with a white coating known as sulphate. If you are having trouble of this character the following directions for sulphation treatment will probably be of

For sulphation treatment charge the battery as rapidly as it is possible to send current into it without overheating. The re-sistance being greatly increased by the cifeet of the sulphate, the cell will become bot when charging. Use a thermometer in the electrolyte to test the temperature and maintain the current at such a value that the temperature of the cell does not exceed 11-9 degrees F. Continue this charge until the plates begin to gas freely, then reduce the rate of charge to the eight-hour rate and continue this until the plates again be-gin giving of gas. The rate of charge should then he reduced to half the eighthour rate and continued until further gassing again occurs. The cell should then be parily discharged and the treatment re-peated. This cycle of operation may have to be carried on for some time, but should be consinued until the negative plates show at least 0.10 volts between a casmium clestrode and the negative plate, the cadmium being positive to the negative.

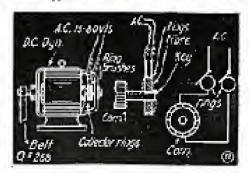
ALTERNATING CURRENT FROM D. C. DYNAMO.

(288) G. L. Le P., Iowa, wishes to use some form of mechanical interrupte: on his 119 volt D. C. dynamo circuit (8 K.W.) instead, of an electrolytic interrupter, for operating his wireless set.

A," I. We do not know anything to seggreet in the matter of operating a couple of ½ KW, transformer ends on 110-volt D. C. circuit with some form of mechanical interruptes. We would further advise that it is not generally subsfactory to use a mechanical interrupter for 119-volt sir-

enits in the way you propose.

A suggestion for you in this direction.



A. C. From B. C. Dynamo.

and we believe you would find it the best of all, is cited below; besides, this would enable you to use a rotary spark gap of the symbosous type.

The sketch depicts this suggestion in thetail, and it simply consists of placing two brass collectors on your dynamo shair, with two brashes placed in contact with the rings, from which to take alternating current. These two rings are connected to by bolk, and also you can arrange your rotary spark-gap that or arm on the end of the shaft by extending same, if neces-sary, and you will then have a synchronous spark gap outfit similar to the Fessenden style commercial sets.

With this arrangement you may use a closed-core wireless-oppe transformer, etc., er you might make up on open-core trans-former from three M-KW, transformer

instead of the rotary gap you can also very readily employ a cuenched spack gap. We presume your D. C. dynamo is a twopole machine, and you will then get in the neighborhood of 60 cycles frequency A. C. with the areasters running at 3,600 R. P. M.

The commutator is left the same as 4.

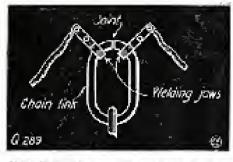
now is, and if you desire to take A. L. only from the machine, and if there is not sufficient room to place the collector rings. and their liber drum between the com-nectator and the bearings, you might arrange to assume this drum and rings on top of the commutator. A local machinist can do this for you at small expense.

Another scheme in this direction is to mount the collector-ring drem on the pater and of the shaft beyond the hearing and to bring the two wires to the collector rings from the estimated through a small hole bored through the center of the armature shaft, as the sketch shows.

ELECTRIC "CHAIN" WELDING.

(289) John Burkett, Madoc, Out, Can, asks several quations.

A, 1. There have been no recent de-



How Chain Links Are Welded Electrically.

velopments in the use of from cores for high-frequency timing coils, etc., and the reason why they are not used for this purpose is due to the fact that the iron tends to lag behind the magnetizing cursent in its magnetic reversals of polarity, etc. This creates a very but power-factor. and occasions, therefore, considerable losses. in the goil.

A. 2. Answering your second question regarding the welding of wire fracing and chain links, etc., by electricity, would say that this takes place on the basis that the electric current will always, of course, take the shortest or lawest-resistance path through a conductor, and you can thus see that by proper arrangement of the webling-machine inwa and contacts the thortest path for the current will, for instance, in the case of a chain link be through the joint in the link, as the sketch herewith

Special arrangements of the culture jaws. of the welding amphine are made use at in electric fence welding.



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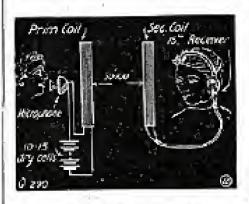
The theory of this work is that the electric current will always, as aforesaid, take. the path of least resistance through a conductor, and as the greatest amount of ourrent will thus pass through the shortest part of the chain link, for example, it is patent that this part of the circuit will beconse the hottest and will thus be welded electrically, as the beating effect in a cirquit is due to the value of the current in amperes, squared, multiplied by the resistance in the circuit in ohms.

INDUCTIVE SYSTEM RADIO-PHONE,

(200) Edward L. Jewett, Sullivan, N. H., inquires about building an inductivetype wireless telephone using two large rails of wices acting on each other by electro-magnetic induction.

A. I. Regarding the inductive type of wireless telephone, would may that of course the large the only are made, other things being equal, the better this arrange-ment will talk. It is, however, only adapted, generally speaking, to short-range dem-enstration work and the lifer.

The wire you mention for the coils is all right and it is well to make the receiving coil of finer wire, as suggested, as the receivery of costise have a higher resistange and cannot be benefited by the heavy



Inductive Type Wireless Telephone.

current generated in a coil of large-size

You are correct in assuming that it is the unipere turns in the coils which count most; but of course the various peris of the circuits should be properly colated to each other in any case. This matter is fully discussed in H. Gernshack's 25-cent book, "The Wireless Telephone," supplied by our book department.

RADIO QUESTIONS.

(2H) L. B. Wikos, Angela, Ind., 48ks as several wirders questions on spork gapa, etc.

A. I. The ristary spark gap you men-tion should be all right. To properly break the detector circuit with break-m system, as you mention, the detector should he short-circuited by means of automatic switch or by extra contacts on the transmitting key, whenever the transmitting set

is excited.

We do not recommend an iron-filings refer you to the February, 1915, Elevericel Experimenter, wherein you will find queves

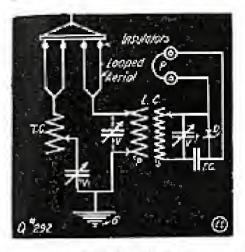
given for reading wave lengths direct. We do not recommend an iron-fillings case for your transference, but a sheetfrom or an from-wire one will prove suarrior, we believe.
The wireless station at Key West, Fla.,

sends time signals and weather reports via

rad e at moon, Eastern time,

VARIABLE CONDENSER CON-NECTION.

(202) Austin Hewes, Crote, III., wants know how to hook up a variable condeser to his radio receiving set, and he



Laupest April 6 Compections.

also complains of severe static signals to

his phones,

A. 1. The variable condensor may be connected across the secondary of the loose coupler. The diagram here shown has been used by several of the commercial radio companies and you will find this arrangement will enable you to tune out a great deal of static, etc., through the static tuning loop, comprising a tuning call T.C. and variable condenser V₁, as observed.

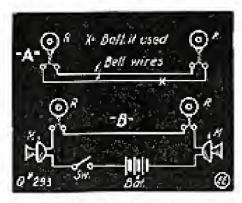
SERIES TELEPHONE.

(293) H. J. Brown, Cleveland, writes us regarding the use of two Theorem telephone receivers on a bell circuit for

telephone purposes.

A. J. We give you berewith diagram (at "A") showing you have to use a couple of telephone receivers of the 75-ohm type for carrying on conversation over a bell wice circuit, etc.

It cometimes improves matters a great deal to connect a couple of dry batteries in the circuit, and you will vistly improve the efficiency of this arrangement is you connect in a couple of regular microphorars



Scotes Telephone Hookellis

"M." You will then have what regularly constitutes a series telephone circuit, espable of talking over a number of miles. The battery should be cut out when through talking by a switch.

Note: On July I the subscription price. of The Electrical Experimenter goes to \$1,00. Don't fail to take advantage of the present lew rate. See page 95.

図 SYLENL YDAICE 図

Edited by H. GERNSBACK

Shall He Patent Detector?

(1) Alfred Smith, Waskegon, Wis. submits a drawing and plans of a wireless detector stand; he wishes to know if we advise him to apply for a patent on the ападтанаепт.

(A.) As a general rule would be in-yeators of detector stands could save a lot of money and energy by not trying to putent such devices. While we do not say that a patent could not be obtained on the detector stand described by our cor-respondent, we certainly will say that such a patent would assusefully not be of smull-

commercial value.

It should always be borne in mind that it is a rather simple matter to obtain, a patent, but it is another thing to exploit the same patent commercially. After all, a patent is not obtained except to exploit it commercially; it is no honor to have a long list of patents that lay idle and on which much money has been expended, if such patents are not utilized commercially. In the case of the detector stand of our correspondent the article no doubt has some briginal points, but none of them is novel enough or strong chough that it could not be evaded by a clever constructor. There have been so many detector stands described in the current literature that it is almost impossible to find any kind of a detector movement that is movel and that could not be easily modified. by anyone,

We strongly advise would-be inventors. not to spend money in trying to patent de-

tector stands or similar appliances.

"Patent Applied For."

(2) Henry Schneider, Milwanken, Wita asks us if he can market an article on which he has applied for potent some time ago, but on which the patent has not as yet been granted.

(A.) We strongly advise against marketing any article which has not been patented. The more reason for applying patent does not mean gnything whatseever and affords no protection for the following reasons:

If your article, on which you have present applied for is put on the market, and if a competitor should market a simthat atticle it will be impossible for you to bring any action against him because you have no patent. Also, if your com-pelitor wishes to do so be can file a patent application covering the identical article. This means that there would be in the Patent Office immediately what is technically called an "Juterference," The Patent Office will then throw the two applications. plications out and will let the two con-testants fight the case out between them-selves. This usually is quite an expensive procedure and unless the invention is quite valuable it is not feasible for the two con-testants to fight it out in court. Most of the time the patent once is Gropped all together, while the original inventor must either go on fighting his opponent or else allow him to manufacture the same article, Another feature is that it is impossible to foretell how soon a patent will issue even if no "Interference" is recorded at the Patent Office; your patent may not

issue for years. In the randowhile a competitor could establish a growing business and while you might collect back royalties from him afterwards, if your patent is finally provenvalid, it invariably means expensive law suits. Pesides, if your competitor has once obtained a start it is usually very hard to stop him,

For these reasons we would advise all inventors to be very caucious and not to market an arricle entil the patent has been

granted by the Government.

Once you can show that the patent has been allowed and your label or literature is sent out with your merchandise calling attention to the parent, most people, ma-less they feel sure of shelr groups, will rost attempt to manufacture the same article. This is where a patent usually pro-

Is Switch Patentoble?

(3) Alfred B. Duck, Richmond, Va. has sent in a rough sketch of a switch and wishes to know if we advise him to patent

the invention.

(A.) The sketch is so rough and mountplete that it is impossible to tell just how this is supposed to work; also, the description is not clear enough for us to form an opinion of the function of the supposed invention. We would ask our correspondent to send in a better sketch and a better description.

We publish this merely as a request to inventors to make their sketches as clear as possible when, sending frawings to this department. This will do away with a great deal of delay and will make it possible for this department to publish the answer at once. It should be borne in ruled that this department does not answer patent questions by mail, but publishes all paformation of this kind for the henceft of information of this kind for the benefit of all renders.

Search for Patentability.

(4) Fred P. Opp, Cleveland, O., asks as how much it costs to have an attorney make a search in the Patent Office in order to find our whether an invention is patent-

able. There is no fixed charge for work of this kind to our knowledge. Some attorneys do not make any charge whatso-ever if they have an order to patent an in-vention. Others charge small sunts from a few dollars upwards, all depending upon how much work has to be expended.

At the Patent Office most inventions are filed in classes, thus, for instance, there is a class for wireless detectors, another class for non-refillable bottles, another class for electric lamps, etc. It is easy to understand that if a patent attorney must consuit several thousand previous patents the charge will be very much higher than in the case of a new art; as, for instance, a wireless detector, of which not over 200 have been puterfied. For that reason it will be seen that it is impossible for anyone to say how much the ice will be, and the best thing in this case is always to consult a patent attorney and find out. Such information is gladly given by all atterneys.

Patenting a Hook-up,

(5) William B, Nelke, San Francisco, Cal., has sent in a blue print showing the hook-up or diagram for a wireless tele-phone and wishes to know if we think that he can obtain a patent on this invention.

(A.) Nothing new is seen in the hook-

up which our correspondent has submitted

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to us. While the arrangement of the choke coils and the connection of the interophone differs somewhat from existing econecthing to attempt patenting this hook-up, as

we are quite positive that no patent could possibly he obtained.

We advise against attempting to patent any kind of a hooloup because it is one of the very hardest things to obtain a good patent on mere connections or chiquits. Unless some novel instrument or other features are made a part of the patent a cir-cult alone will not be af much value, as most anyone could use such a circuit anyway, privately or otherwise, and it would he almost impossible for the patenter to know whether advante was infringing on his patent or not. There are, of course, a good many circuits of, as they are usually termed, systems patented, but we doubt if there are many of much commercial value.

BARON MUNCHHAUSEN'S NEW SCIENTIFIC ADVENTURES.

(Continued from page 20.)

"tasted" exactly like sulphurie acid fumes, similar to the fumes given off by a stor-age battery when it is "gazzing." After a lew minutes we became accustomed to the sharp atmosphere, but we found it very hard to breache at first. These our bewildered senses became conscious of the fact that we felt a warm glow all over our budies and in a few minutes we became ex-hilarated as if inconceased. For three-quarters of an hour we were actually drunk, and it was exceedingly hard to think elerly during that time. This effect, how-ever, were off too, and at the end of the reconsidering we could breathe fairly may second hous we could breathe fairly sasy, although our longs pained terribly at d we spat blood at frequent intervals.

An analysis of the moon's atmosphere As analysis of the moons atmosphere made by he shortly thereafter explained our old behavior and the strange effects of the new air upon us. To begin with, the moon's air is very thin, only about 1-15th the density of the earth's atmosphere. Where the earth's atmosphere is composed of about 79 per cent, nitrogen and 21 ner cent, oxymen, the moon's atand if per cent, expect, the moon's at-mosphere countries 25 per cent, carbon diox-ide, 31 per cent, nitrogen and 50 per cent, uxygen. The carbon dioxide caused us to cough so violently while the invigorating oxygen in its prepondering proportion in the air intoxicated us. If the moon's air were as dense as that on the earth I doubt if a human being raised and brought up on earth chald survive. But by being 1-16th as dense as the terrestrial atmosphere, to-getter with the fact that exygen is very beneficial to the respiration, it becomes possible to endure the moon's thin air comis becomes fortably. It is interesting to note that if vitality mecessary human nature will adapt itself autocassfully to even the most diffi-cult surroundings. This we found out speedily: within 48 hours we not only breathed with comfort and wholly without pain, but we found the new air so enjoyable as well as invigorating that we looked forward with dread of again inhaling the study recreatinal atmosphere. After one grows accustomed to the singular smell of the moon's air one copies to checist; it, lit acts like a powerful togic, the exygen ac doubt being largely responsible for this.

At first, of course, we found it very diffi-cult to walk on the moon's surface, for the season that we weighed so little now. The earth being 50 times as large in bulk and 1.56 times denser than the moon, it naturally attracts all badies with much greater force than does the moon,

These is None Ulke in.

Tale Prof. type Turer, tate is incide over all, 39 worsh with Essencied. Were, has double give; and in hepself switch to early licker twicing. Price, early licker twicing. Price, early licker twicing. Price, 65.00.

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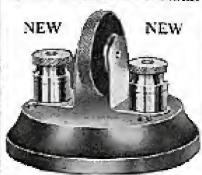
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Electricity is now largely utilized in the production of moving pictures.



Thus a stone weighing one gound on earth weight but 0.167 the on the moon, which is just one-sized or the weight the stone has an earth. My own weight on earth being 170 lbs, it naturally follows that I could weigh but 28 lbs, on the moon. Buster, who weighs some 10 lbs, on earth, weight has 135 lbs, on the moon. He found this pat som when he began to imped higher than about 4 teet. On the moon his 115 lbs, carried him six times higher, for he expected as much mutcular energy in his jump as he was accustomed to do on earth. Consequently he went up some 24 feet into the six. This trighteded him considerably, for he had never jumped so high in all his life. As in the Twarstollar," he become more careful thereafter and ismitted his jumps to 19 or 15 feet in height.

Flicternix, as well as moself, amused ourselves in a temping contest for some time and it was automisting to us how high we could jump. Twenty-five to 39 feet was easy of accomplishment, and we did not come down hard either, for we weighed so light. One thing, however, we found out specifly. The mose's atmosphere even as the light elevation of 30 feet becomes an thin that it is impossible to breathe. For that season we discontinued non-high jumps soon and preferred long horizontal jumps after that. Subsequently we established the tollowing facts:

The only atmosphere in which any kind of living creatures could exist extended but 20 feet above the surface of the moon. Sixty feet above the moon there was no trace of atmosphere. Here the vacuum of space begins. On earth, it will be noted, no atmosphere exists beyond 35 miles above sea level. Thus we found it impossible to scale the lunar mountains or even a low hill.

These being so little atmosphere on the moon, no clouds whatstere, and but very little wind, it follows that the temperature of the moon's surface mast be rather competations, who measured 18° Fahrechelt in the slade of the "lateratellar." Nor did this summer has subdue during the long day of nearly two weeks. (The length of the day on the moon is almost two weeks, the length of the night being of the same detailors.) This intense sublight also made it impossible to walk about wi had so made it impossible to walk about wi had bedught our tropical substances along we were but little troubled on our long trampt, deeple the heat. Without this precupition out hads and face histored restally, the no doubt to the effect of the sen's aftin-violet anys through such a thir atmosphere, which offered but links protection.

After several hours immediately following our landing we concluded to heave the desert in order to investigate the nearest chain of mountains some 60 miles distant. Re-entering the "Interstation" we started our teactor machinery and the his globe began to roll on its wide landing belt over the hot sands of the mon at a comfortable speed. In a few hours we came to a dead stop in the shade of an enormous mountain rising some 16,000 feet above the surface of the mon. No vegetation or any som of life could be perceived anywhere, but curious marks on the ground convenced as that there must be indeed some form of life on the earth's satelline.

Assuing curselves with our large enliber gues we set out to follow the tracks. Buster, who ray ahead of us with his nose to the ground, had become excited and within a ren minutes' walk we entered an immense carryen with almost perpendicular walls several this sand feet legts. This canyon was nearly closed at the top and



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it was probable that the sun never arached the bottom. There was but little light and we had to atwance muticutly, guided by Buster.

The temperature was rather comfortable, about 30° Falmenheit, as our subsequent

investigation proved.

As we walked on, the canyon seemed to become lighter, but we soon observed that it was not spalight. The color of the light was of a pale green. We were very much puszled at this and not a little excited, so we pressed on forward. We finally founded a projecting corner and beheld a sight such as no humans had ever seen before.

The capyon, which by this time had become entirely closed at the top, suddenly widened out into a colossal cave of im-mento proportions. We found out later first the care was soughly 12 miles in length and 6 miles in Ineadsh. Although entirely closed at the top it was almost as light as day laude, the light, however, being of a vivid green. Almost the entire bottom of the cave was taken up with a take and the light came from the lake itself. Within a few minness we had reached the edge of the water and we saw im-mediately why the lake gave furth such a

We stood foreinsted for some time at the sight which presented itself to our eyes. The lake was crowded as far as the eye could reach with a sort of cel fick

-and each fish was luminous.

You have, of course, seen the common firefly during a hot summer evening. Take your fitely, extend it about four feet to the size of un cel, put it under a clear limpid water, and you have a good descrip-tion of our lunar luminums lishes.

The sight of these strongly illuminated cells darting back and forward under the water with lightning speed is enagnificent; is offers a wonsterful speciacle. You can follow each lish to a considerable depth, for the light which they emit is very powerful. We found out that each lish produces scene 60 candispower of fight. Here at last we are face to fose with an exceed-ingly practical application of "cold" light, which our terrestrial scientists have been searching for for decades. We also ob-served that the lishes are luminous only while in motion. As soon as they stop swimming the light vanishes instantly. We have since observed that the light is pro-duced by the friction of the rish's body against the water. Flatternix is not some as yet whether the action is electric or

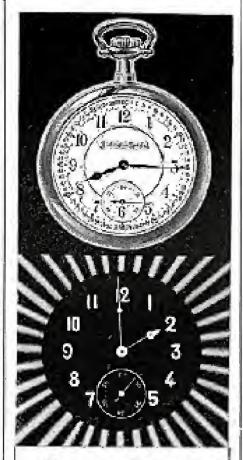
chemical.
We misseled how nature always finds
out a way to favor life, even under the most difficult surroundings. As life was manifestly not possible on the moon's surface on account of the blistering heat (and the extreme cold following) nature promptly produced it under the surface. As the higher forms of life require light for their existence and as there was no light under the moon's surface, nature saw to it that its life carriers were equipped with

light themselves!

ive were materally overjoyed at our discovery. We knew now that there was at least water on the moon, despite all our stientists' thronies. Buster was the first to try It and after a few rautions I cks he decided that it was really water. We followed suit and immediately noticed that the water was slightly tart in taste, which, however, made it an excellent thirst queacher.

We discovered later that all of the moon's subterranean waters instead alike, the tartiness insteadable being produced by the ener-occurring sulphur which securs to abouted on the more,

We found it was comparatively easy to catch one of the luminous fights, which



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Address.

was almost 4 feet long, and after killing it. we decided to take it along to test its edi-bility. During the next few hours we also killed several luminous tartles of enormous size. As we did not see any other living creatures on the shares of the lake we decided that it must have been one of these turtles whose footprints we had seen outside of the canyon.

A survey of the cave showed that its southern wall was composed almost enrirely of some form of coal similar to our terrestrial anthracite. We knew now that we were in no danger of starting. We had the water from the lake, meat from the fishes, as well as the nertle, and fire from the coal. We matterly felt highly elated, so Flitternix as well as myself decided to extend our visit to the moon as long as practical in order to fully investigate tists. newset world.

During the next few days (by this I mean a day of 24 hours' duration) we explored the entire cave and we came across many queer animals, mostly of the inrile type. We found few hairy or feathered types and nothing that appreached even distantly the homan form, as, for listance, the monkey type of our earth. We found that there was quite a little vegetation inside of the case, mostly of the fungus type; there were also low strubs and some dwarf forms of a populier bread tree. This bread tree is very similar in many respects to the terrescrial bread tree (Arthographicological) as grown in some of the Pacida Octan islands. We found its fruit, after boking it, highly nearitious as well as exceedingly tasty. The turtle meat was exceedingly taety. The furtle meat was ex-cellent and the ashes tasted somewhat like tels, with a fresh-water trout flavor. We found many varieties of mushrooms, some of enganeous size and mostly edible. There of entrinous size and mostly edible. There was, furthermore, an abundance of various curious nut bushes and, with a few exceptions, all were very tasty.

You see we do not starve on the moon, even if it does look flead through a telescope. On the contrary, we are well proindefinitely if we were so inclined. As a matter of fact we are in up hinray just now to return to mother earth, we like it so exceedingly well here.

We discovered soon that there were thousands of caves such as the one which we first discovered seamered all over the moon. These raves are all much the same, all illuminated, by means of their luminous assimals. The caves vary, of course, much in size as well as in shape; some of them are hundreds and some even tens of shousands of fest below the springs of the moon. This is quite natural. The moon is a cold world unlike the earth, which is still in a molten state in its laterior. The further you designed in the moon's bowels the colder it gets, but the atmosphere becomes denser also. Equipped with electric kinterns, we visited a case several hundred feet below the moon's surface. The cold was intense, and we saw no living being of any surf, nor any plant life. What had been water once, myriads of years ago, was we now, frozen down to the bettom. The sight was 50 desotage and so depressing that we harried back to the surface as soon as our investi-gation was completed. We decided not to visit any more caves except those located near the surface of the moon, where the solar heat still could make itself felt.

During the next few days we found immense deposits of various metals, such as platimum, gold, copper as well as iron ore. There seems to be an abundance of these metals on the moon. We also found a metals on the moon. curious metal (or it may be an afley) which queles at a temperature as low as that of tim, but is as band and flexible as steel.

Witte and the second

We named it Busierinss in honor of Busier, my few terrier, who was the first ter-restrial being to land on the moon.

But now, my dear Alier, I must termi-uate our chat for this evening. This is This is moving day for us. The sun is chacking us rapidly said Flatternix says we have only

ragnory some transmit says we make things there is not point follow you, my dear Münchausen; would you be a little more

explicit, please?"

"Certainly, my loss. You know that the moon revolves on her aske once in about 27 days. Her term of daylight must therefore be the half of 27 days, or nearly two weeks, and her night must consequently be-

weeks, and her night must conveniently in of the same length.

"At the present we are a mewhat to the neighborhood of the moon's equator. Within a few hours the spot on which I sit will be in the dark—it will be night—the leginding of the linar two weeks night. Already the sun is low in the heavens. As the temperature will fall helesy access a moon as might act at the null as below zero as soon as night sets in, and as we do not cherish to be drugge we have no taker choice but to move our present position. We will, therefore, break up our camp shortly and will beard the "Julya stellar" once more. A few hours' ride will bring us to the other side of the moon, where it is now morning. Once we reach that spot we can make camp again for two weeks, the duration of the limar day.

"Well. I must hurry, my dear boy; any how, it is one o'clock for you now and I have an idea that your bed is calling you. Therefore, an ervoir till next time.

Kare-re-or-er, Zere-re-re-or, Zere-cer-ec-cre é é é é é ceh-blob-blobb-flum-, and br. was goor. The ether was quiet unue

ELECTRICITY, THE POWER BE-HIND THE SUBMARINE BOAT.

(Continued from page 195.)

base on beard a German warship or a land station.

The general lay-out of the electrical equatement on board the submarines, and particularly the storage battery unit, is such that when cruising, he when iging so, the oil engine can be used to drive the dynamoby suitable throw-over mechanical generand. the dynamo then charges the storage bat-tery so the vessel will be seady for the next dive under water.

The storage battery supplies electric curcent for a barge number of different apparatus on board, including several elecsubmersion pumps; also the current for operating electric beaters placed about the walls of the submarine, electric lights, the andio transmitting set, compressed air pump, small 4 hip, motor for turning the sighting periscope, through which the cornmanding officer obtains his view of watships, etc., on the surface of the sea, as the illustration above, et cetera.

Also other uses of the electric current include that for heating the stores or ranges for cooking the meals of the tank. electrical traggers or release mochanisms for discharging the torpedoes through the torpedo subes, and which are propelled out of the tube by compressed air from an air storage (airk in most cases. Also a small but powerful electric statebilight is provided on the upper deck of the submarine, which can be used when she is cruising on the surface, and duplicate installations are made; on the upper deak as well as on the inside reason control deek where the commanding officer stands

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HENRY ZUHR 55-34 Framkfort 55-New York City of the latest type electrically-driven gyroэсорис-солграза.

The submarine also has suitable running and signaling electric lights at her mast-lead. The steering is done by electric motor control and the boat carries an electrically driven capetan and other refine-ments such as electrically abbrated subma-rine signal to be used in case of distress. etc., and which sends out powerful vibrations through the water which may be picked up by the mother ship of the flotilla.

The modern submarine is, furthermore, equipped now with a complete telephone instellation as well as speaking tubes from the officers' central control deck, so that orders may be transmitted from the contmander's position before the periscope to any part of the best instantaneously. It in now common practise to fit the subma-ring with an auxiliary electric lighting sys-tem equipped with 6-volt partable lamps and storage battery as well as dry battery. in order to operate same for several bours in cases of emergency.

In since of war it is thus some that the submarine commander has a very highly perfected and constalized means of con-trol which is at his fagers' ends, so to speak. When he has sighted a warship of the enemy which is to be to-pedged, which the enemy which is to be corpequed, which sighting is done by coming to the surface for a few minutes to that the perisonne projects allowe the water a foot or so, he then gets the range and swings the submarine so that one of her torpedo tubes is pointed in the proper direction at the county ship. He can then press an electric butten which controls the compressed air buttens of the proper torners into the and discharger of the proper torpedo tube, and he wilt then, and generally does, submerge Sinstantilly.

All of this may sound complicated but as a matter of fact it only requires a few seconds, or at most a few minutes, to bring the submarine corpedo tubes into the properangle to his the enemy's ship, momentarily rising to the seriace so that the periscope will give a view of the target for range-finding so as to accurately discharge the list peds.

In most cases, before the gun pointers of the warships can discharge any shells at the sufactation it has suck from view, and the next minute they may be hit by the ter-ible torpede, which has the power, in most rates, to quickly sink the most powerful and heavily armored dread-ought alloat. The torpedges fired have a range of two to three fulles and even mere in some types. In should be speed that our illustration there are the same details and the contraction of the tration does not show every detail, such as chairs, tables, banks, ore, as these are ontside the scape of this treatise.

MARCONI INJUNCTION HOLDS.

Judges Lacombe, Word and Rogers, sitting in the Circuit Court of Appeals, handed down a decision recently attirming the order of Judge Hough granting a preliminary injunction to restrain the de For-est Radio Telephone & Telegraph Co., the Standard Oil Co. of New York and Lee de Forest from infringing the fundamental Marconi and Lodge patents relating to wireless telegraphy.

It had been urged by the defendants that is was unlaw that they should be restrained from the use of the de Forest system pending the determination of the patent action brought by the Marconi Wireless Tele-graph Co., on the ground that the Marconi people had recently raised the price if charged steamship companies for the use of the ayatem to \$100 a month for each

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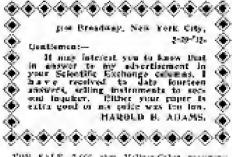
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